

COMPUTERWORLD

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DPMA Conference Opens in New York

NEW YORK — "Heavy on-site registration" was predicted for this week's annual conference of the Data Processing Management Association (DPMA), headquarters personnel said last week.

This meeting, Tuesday through Thursday, marks the first time in a decade that it has been held in New York, noted President Edward O. Lineback.

Exhibits at New York Hilton hotel are open from 11 a.m. to 6 p.m. daily, except Thursday, when they open at 9 a.m. Tours of area industry sites are set for Friday.

The keynote session is set for Wednesday, with Univac President Gerald G. Probst expected to comment on "new and broader responsibilities of the EDP professional to top corporate management," DPMA said.

Registration hours for the week were set for 8 a.m. to 8 p.m. Tuesday, 8:30 to 5 Wednesday, and 8 to 5 Thursday.

Gunman Kills One, Wounds One of Value Computing Reps

CHERRY HILL, N.J. — Two Value Computing sales representatives were among the victims of a gunman who ran through an office building here last Wednesday, killing six men and wounding six others.

Theodore G. Hall, 38, of Willingboro was killed and Val Riskoe of Grovesville was critically wounded. Value Computing is one of eight companies with offices in the building.

The gunman, identified by police as Edwin Grace, 32, of Brooklyn, was found in critical condition from a self-inflicted wound.

On the Inside This Week

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Decision Expected Soon
In IBM-Greyhound Suit — Page 25

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Notifications Would Total Millions

Disclosure of Fed Dossiers Proposed

By E. Drake Lundell Jr.
Of the CW Staff

WASHINGTON, D.C. — The U.S. Government would be forced to notify millions of citizens that it maintains computer-based files on them if a bill presently being debated in Congress is passed.

The bill, H.R. 9527 in the House and S. 975 in the Senate, would require all government agencies maintaining dossiers on individuals to disclose the existence of those files to the individuals concerned.

In addition to forcing a great deal of work on the government's computer operations, several sources here see the measure as a test case on Congress' attitude toward privacy and data banks, indicating that the restrictions in the bill on government operations might be extended to private data bank operations.

Citizen's Privacy Act

In addition, the measure — known as the Citizen's Privacy Act — would prohibit the agency from disclosing the files to anyone without the consent of the individual covered by the records. It would also require the agencies to notify an individual if they planned to start a file on him.

The measure, in addition, would give

individuals the right to inspect the files and to add supplementary information to those files if needed.

Excluded from the act would be files "specifically required by Executive Order to be kept secret in the interest of national security [and] investigatory files compiled for law enforcement purposes, except to the extent that such records have been maintained for a longer period than reasonably necessary to commence prosecution or other action."

The measure is sponsored in the House of Representatives by Rep. Edward Koch (D-N.Y.) and in the Senate by Sen. Birch Bayh (D-Ind.). Hearings are being held on the bill by House Subcommittee of Foreign Operations and Government Information.

During hearings last week, Rep. Koch stated that "in the computer trade — and I'm sure this is true in the case of persons in the federal government concerned with data processing — efforts are directed toward increasing the capacity of data processing equipment to store, cross index, and retrieve information on individuals."

"Providing safeguards — such as the review of computer tapes for outdated materials and their elimination or checks

within the system against human and mechanical errors — reduces the efficiency of systems and requires valuable machine time."

Therefore, he continued, "it is unlikely such safeguards will be taken voluntarily and it is important that the congress require that safeguards — essentially establishing a balance between privacy interests and efficiency — be established."

The bill, which has picked up 135 cosponsors in the House alone, would open
(Continued on Page 2)

Policy 'Renewal' Is Ruled Valid, \$21,100 Awarded

By Edward J. Bride
Of the CW Staff

KNOXVILLE, Tenn. — Manual delays in data preparation for computer input have resulted in a lawsuit and court decision against an insurance company here.

Mr. and Mrs. Robert Lane Jr. won their case, a \$21,100 judgment against Traveler's Indemnity Insurance Co., in Chancery Court last month.

Traveler's, a division of the Traveler's Insurance Companies, of Hartford, Conn., said it was considering an appeal of the decision.

According to Traveler's, the Lane's applied for a policy on March 3, 1970. An agent approved their application, forwarding it to company underwriters and to the Hartford data center; this act, Traveler's said, was tantamount to a temporary policy, good through June, 1970.

The Knoxville underwriters decided the
(Continued on Page 2)

IBM 370 CPU, Telex Peripherals

Total Lease Plan Offered

TULSA, Okla. — Users planning to install IBM 370 equipment can now save up to 30% on a five year plan and as much as 65% of the IBM rental on an eight year plan through a Total Lease Program offered by Telex here.

In dollars, a typical 370/145 installation can save up to \$6,300 a month or almost \$75,900 per year by leasing the system from Telex with Telex peripherals over a five year lease. During the five years, that amounts to savings totaling \$379,980.

In addition to these savings, a user can also save on the overtime presently charged by IBM since Telex does not charge for overtime usage.

For example, the 370/145 user with 178 hours of overtime monthly would save an additional \$2,045 per month, \$24,540 per year, and \$122,700 over the five year period of the lease.

The savings available depend on the length of the lease and the amount of Telex peripherals used with the system, the firm said last week as it announced it had established the Telex Leasing Division with headquarters in Phoenix.

Itel Offers New Savings

At the same time, Itel announced a deal with Telex that will allow Itel to offer its users another 5% to 7% savings on the Itel Packaged Lease Plan for 370 equipment [CW, May 10].

It would allow Itel to offer 3803/3420-compatible tape systems manufactured by Telex, thereby upping the savings available to its users.

Previously Itel had offered leases that could save the user between 15% and 60% of the comparable IBM rental price by offering 370 equipment with Itel memory
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GSA Restricts Simulation Use As Tool for Comparing Systems

By E. Drake Lundell Jr.
Of the CW Staff

WASHINGTON, D.C. — The accuracy and validity of presently available simulation systems used for comparing computer equipment has not been established, according to the General Services Administration, the major computer buyer for the U.S. government.

As a result, the GSA has restricted the use of such systems for the rest of this year in favor of benchmark tests of proposed computer equipment.

"The simulators seem to be accurate on the equipment of certain manufacturers," a GSA spokesman said, "but they are extremely inaccurate on equipment from other manufacturers."

"A properly conducted benchmark," he continued, "is definitely the most accurate tool available at the present for evaluating computer equipment."

"But it is often more expensive than present simulators," he added, cautioning, however, that an extremely accurate simulator might be more expensive than benchmark tests in the long run.

While restricting the use of simulators as aids to evaluating equipment, GSA did not ban them entirely from the computer selection process.

Under the rules, which apply to all federal agencies, GSA said benchmark tests were the "preferred" method of measuring the effectiveness of computer
(Continued on Page 2)

Rights for Individuals in Fed Data Banks Proposed

(Continued from Page 1)

up a "Pandora's box" according to several sources here.

Literally millions — and perhaps over a billion — files are maintained on individuals by different government agencies, they said.

The job of notifying each individual covered would be a logistics nightmare, they added.

The bill only covers information supplied to the government by other than the person covered in the file, however.

Therefore, if a person gave information to the Civil Service Commission, the Social Security Administration, or the Internal Revenue Service, he would not have to be notified that it maintained a file on him.

However, if any government agency used other sources of information about that person — such as bank records, personal interviews, etc. — it would have to notify the individual of the file.

Several sources here said the bill may be a test case of Congressional attitude

toward the protection of privacy in computer-based systems.

They note the present bill is much stronger than the Credit Information Act passed last year which required financial institutions to allow individuals access to material about them in credit bureaus, but did not require the credit bureaus to notify the individual on the existence of the record unless it was the basis of a bad credit report.

These sources said if Congress acts favorably on the present bill it could indicate Congress would take a harder line against all computer-based systems containing personal information — whether public or private.

On introducing the measure, Sen. Bayh said that congress must draw up guide-

lines to prevent the misuse of new technology, such as computer-based data banks, "technology which endangers our constitutional rights or privacy, freedom of speech, and freedom of assembly."

"The development of the computer has for the first time made it practical to collect, analyze and instantly retrieve vast amounts of information, however gathered," Bayh charged.

"For the first time it is now possible to maintain a dossier on the activities of great numbers of people. These dossiers may be used — or intended — to stifle legitimate political dissent," he stated.

Bayh said, "We must define more precisely the nature of each individual's right to a sphere of privacy, a sphere in which he can be free from unwanted intrusion.

Any such law should put specific limits on those who would gather and use this information."

Secondly, he said, "we must provide meaningful tools for enforcing those rights."

The purpose of the Citizen's Privacy Act, he said, is to guarantee any individual about whom the government keeps records the right to know that such a record exists; the right to prevent disclosure of such information outside the agency, or, where such disclosure is expressly required by law to know when and to whom such disclosure is made; and — most important — the right to see his own file, to make a complete copy of it, and to supplement his record where he believes it appropriate."

IBM CPU, Telex Peripherals Offered in Plan

(Continued from Page 1)

and disks.

Under the Telex Total Lease Plan, users can lease either 360s or 370s and all major peripherals from Telex, just as if it were a mainframe supplier in competition with IBM.

All of the peripherals — tape, disk, printers, and main memory — are independently manufactured, Telex said, with Telex manufacturing all of the units except the 3330-like disks and controllers it buys from Information Storage Systems, an IteI subsidiary.

Average rental savings of typical configurations of 370 will be around 20% to 30% for a five-year plan and up to 65% for an eight-year plan, according to Robert R. Russell, who has been named vice-president of the leasing division.

"Leases can be written for various terms," he said, "however, five-year leases seem to offer the optimum term for both the customers and lessor."

In addition, he said users would be able to cancel the leases any time after the second year, even though such cancellation would involve penalty clauses.

Savings Available With Telex Total Lease Plan

	IBM Price	Telex Price	% IBM	Savings/mo.	Savings/yr.	Savings/5 yr.
370/135*	\$19,690	\$16,215	82	\$3,475	\$41,700	\$208,500
370/145**	31,725	25,392	80	6,333	75,996	379,980
370/155***	45,121	36,349	80	8,772	105,264	526,320

*Includes a 3135 192K CPU, 2 printers, 4 3330-like disk drives and controller, and eight tape drives and controller.

**Same configuration with 512K of memory.

***Same configuration with 2 Mbytes of memory.

"Actual savings are dependent on two factors: First the amount of extra use a customer experiences (there are no overtime charges on the CPU or peripherals in the Telex plan); and second, the amount of Telex peripheral equipment in the lease package," Russell said.

"Four year 'walk away' leases with no penalties can be provided with a total system lease savings of 8% to 20%," he claimed.

The lease package offers flexible upgrading, Telex said. For example, the Telex monolithic main memory can be field upgraded, as can most Telex tape drives, the firm said.

In addition, the Telex 6330 disk subsystem (comparable to the IBM 3330) and Telex tape and printer subsystems can be added to the system as needed, the firm added. They can either be placed on the normal Telex short term lease, or included in the main lease at reduced rates, Telex said.

Two Men Arraigned On IBM Bomb Threat

NEW YORK — Two men have been arrested and arraigned here for allegedly threatening to bomb several IBM user sites as well as the company headquarters in an extortion attempt.

The two — Michael F. Little and Robert E. Slaughter — were arrested by the FBI after allegedly threatening to set off explosives in the user sites unless IBM paid them \$350,000, the FBI said.

No further details were released on the case by either the FBI or the District Attorney's office pending an indictment in the case. The two were arraigned before the U.S. District Court for the Southern District of New York.

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GSA Cuts Use of Simulation in System Buying

(Continued from Page 1)

equipment under evaluation.

Simulation techniques could be used, however, under certain conditions where benchmarking of potential equipment was not feasible, it added.

GSA also said simulation does not provide sufficient information that would allow users to structure optimum equipment configurations because the input definition formats are too restrictive.

Analysis and interpretation of simulation results is a tricky business that requires a great deal of expertise, that is not found in all government departments, GSA noted.

Expertise in interpreting the results of simulation tests, GSA sources also indicated, was probably as "skimpy" in general industry as it was in some government departments.

The organization also charged that some government bids were worded so a company would have to purchase a specific commercial simulator or subject its equipment to that simulator in order to be considered for the bid.

In the new regulations, GSA prohibited the government agencies from requiring computer companies to use specific simulators in their bids on government contracts, this would allow the firms to use a variety of simulators in proving their products performance.

The agency also prohibited other government departments from using the results of simulation as the sole reason for rejecting a computer equipment bid.

In addition, it said that a simulation input definition format should not be used alone and that a narrative description of the objectives of the computer system and logic diagrams should be included when possible.

The present restrictions on the use of simulators will be in effect until Dec. 31, by which time the GSA hopes to have

developed permanent regulations on the use of simulators in computer purchases. "At present," a GSA spokesman said, "we don't plan to change the regulation

in any way when we make it permanent. However, we are asking for comments from the industry and those may make us take a new look at the subject."

Policy 'Renewal' Ruled Valid

(Continued from Page 1)

Lanes did not qualify for a permanent policy, however, and in mid-April requested the agent to cancel the policy and notify the Lanes.

The insurance company said a special notice was sent to the Lanes, indicating their policy would be canceled "effective April 27, 1970."

Two weeks later, around May 12, the company related, the Lanes received a computer-prepared invoice for continuation of the policy, leading them to believe they were to be covered after all.

On May 17, Mrs. Lane was involved in an accident, and eventually lost a \$20,500 lawsuit. The Lanes sued Traveler's to recover the amount and, if the Chancery Court decision stands, the insurance company will have to pay that amount, plus \$600 in attorneys' fees.

Detroit to Sell Off Machines, No More Punch Card Elections

DETROIT — The city is selling 2,734 punch card voting machines and other items left from the 1970 computer-run elections.

George Dunbar, city elections director, said the equipment will be offered for sale at \$125,000 to try to make up the city's loss on the 1970 primary and general elections. Problems with the machine delayed election results for almost three days.

Following the election the city filed a suit to collect damages from the equipment vendor.

Insurance company officials stressed that the error was a human one — the cancellation simply was never transmitted to the computer files in Hartford, so the policy remained in effect, at least as far as the computer was concerned.

The necessary input documents apparently "sat in someone's 'in-basket' for about 10 days," one spokesman said, calling that period "unusually long."

The local office here is one of about 90 which communicates with Hartford via Flexo-writers using paper tape, he added.

Ervin Seeks Update On NCIC File Rules

WASHINGTON, D.C. — Sen. Sam Ervin (D-N.C.) has asked Attorney General Richard Kleindienst for an update of the security regulations that protect the privacy of records kept in the computerized National Crime Information Center.

In a letter to the Attorney General, Ervin asked for a summary of what categories of information were contained in the files; procedural requirements to protect the security of data; what government agencies receive the data; and "what administrative and legislative sanctions now exist for violation of operating instructions and agreements."

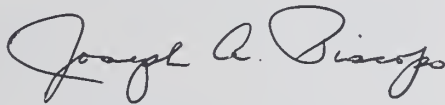
Sen. Ervin also asked Kleindienst if it was true that the Justice was considering transmitting such data by satellite [CW, Feb. 16] and what extra security steps would be taken if true.

An Open Letter of Thanks:

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Sincerely,



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Personnel Research Into Business Needs Shows DP Education Falling Far Short

By Edward J. Bride
Of the CW Staff

TORONTO, Ont. — An eight to ten year gap exists between business computer-training needs and the courses provided by educational institutions, over 100 computer users, educators, and industry representatives were told recently at the Tenth Annual conference of the Association for

See related story, page 6.

Computing Machinery's (ACM) Special Interest Group for Computer Personnel Research (SigCPR).

About a third of the attendees were from the educational community, with about the same number coming from the business sector and the remainder from the computer industry or government.

"Self-assessment tests" are needed in the information sciences field, so individuals can learn their weaknesses and strengths, according to keynote speaker Paul Armer, of Stanford's Center for

Advanced Study in the Behavioral Sciences.

Teachers and curriculum designers are attempting "to ascertain what the individual should know," he said, but this is difficult and probably should be accomplished by ACM.

Such a task is "not inexpensive," Armer admitted in deference to ACM's current financial crisis, but "I think the chances of government support are good."

Computer education has been carried out primarily by manufacturers, especially before unbundling, said Prof. Morris Pollack, of Bronx Community College, a branch of the City University of New York.

The introduction of systems analysis and programming courses in colleges and junior colleges "closely parallels" the heavy introduction of computers into business, but with a gap of eight to ten years, he continued.

Two-year institutions are 10 years behind industry needs, as far as programming and systems analysis courses are concerned, Pollack said. Four-year colleges show a seven-year lag in programming courses, but a 10-year lag in systems analysis, he added.

Industry Needs Not Met

In describing a 1971 study into college-level computer courses, Pollack said "no where did we find an area where colleges



CW Photo by Edward J. Bride

Avoid "management obsolescence" — Armer

were meeting the needs of industry in programming languages," and the situation is almost as bad for systems analysis.

"In another breakdown by function," he added, "higher mathematics — calculus — was the only area" where the colleges "were meeting the needs" of the computer industry.

The study also showed that 70% of businesses did not hire graduates of private DP schools, he said.

Part of this tendency, Pollack explained, could be caused by experiences similar to one which happened to a May graduate who studied under him this year. This individual, Pollack claimed, is now teaching RPG in a private DP school, despite the fact that he has never studied RPG.

He studied programming, the professor acknowledged, but not RPG. He was hired, furthermore, "sight unseen," without an in-person interview, he added.

Prof. Malcolm Gotterer, of Penn State, chairman of SigCPR, predicted increasing union inroads into the programmer area.

In many cases, programming chores can be learned "on the job," and a prolonged course of instruction is not always needed, he said. "Are we really dealing with a profession" when discussing programming? he asked.

A study of one-third of the top thousand businesses listed in *Fortune* showed that about 10% had some degree of unionization, though not necessarily within the DP shop, Gotterer said.

Computer operators in these companies were paid a salary 12% higher than in non-union environments, he claimed. Junior programmers and programmers were paid only slightly higher in companies with "some degree of unionization," he continued, noting senior programmer jobs paid 11% more in these companies.



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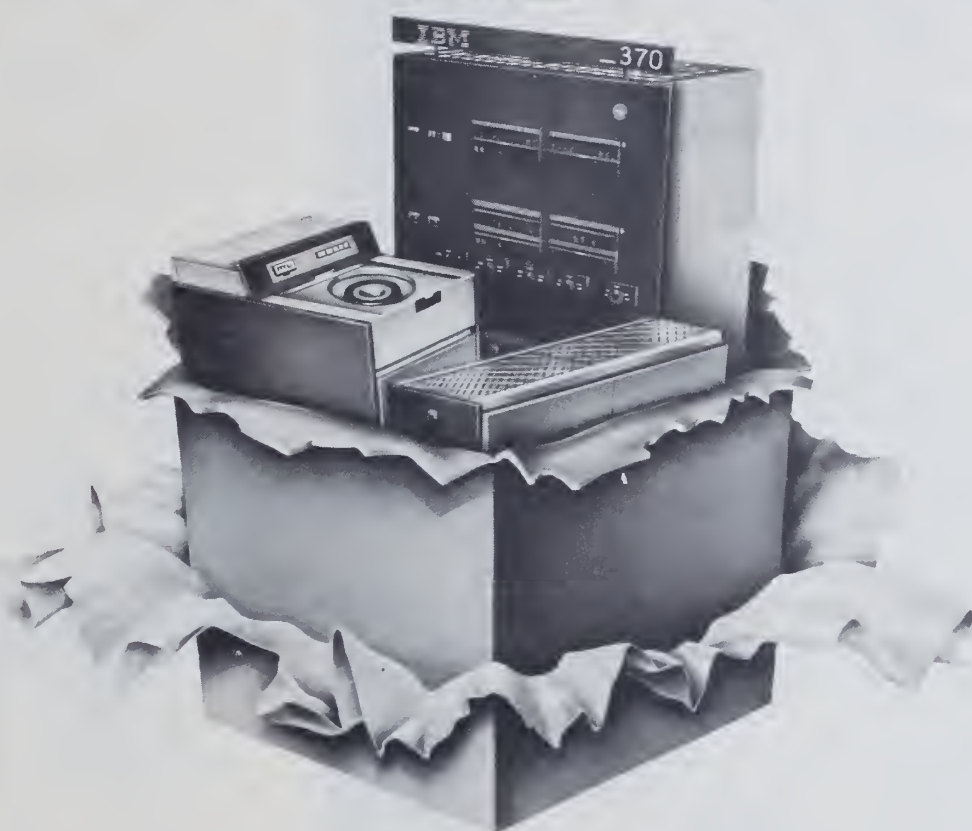
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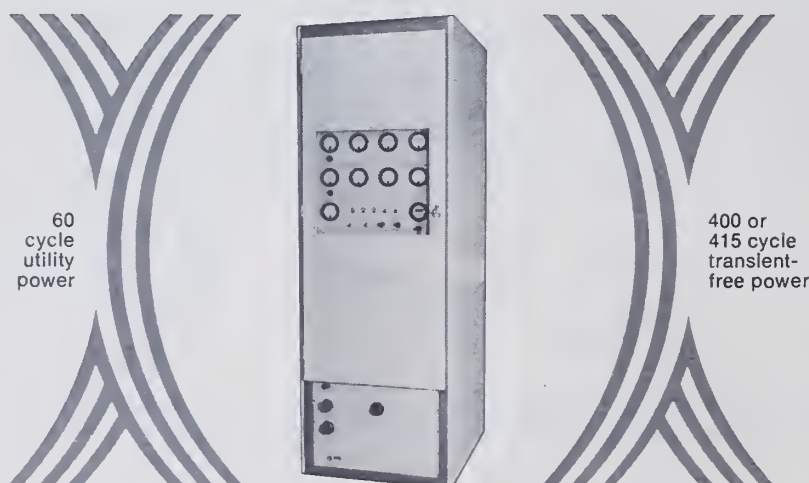
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Panel Says Certification Not Easy — Or Imminent

TORONTO, Ont. — Official or legal certification of programmers will not come easily, if representatives of four DP societies reflect general user sentiments in their thinking.

Current programs offered by the Data Processing Management Association (DPMA) notwithstanding, four panelists debated the relative merits of certification and could only agree that certification is still a "big issue."

The debate was presented

information processing field, Campbell related.

Also against certification is the fact that there are "too many differences in philosophy for meaningful standards beyond the very basic level," such as "thou shalt document," he said.

"I could never see what it could do for me, my company, or the DP community," Campbell stated.

Programmers can be "certified" only at the company level, he said, adding his personal view that such a certificate would be "meaningless and useless trivia."

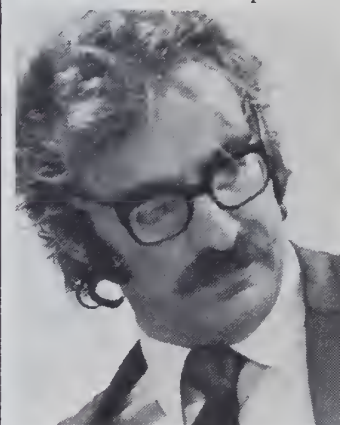
Opposite View

The opposite view was taken by Len Turner, chairman of the DPMA Institute of Canada, which was established, Turner said, to help build a body of knowledge to be used in certification efforts.

Turner said when computer people conduct meetings, "we have something in common. It's 'what we have in common that we need to identify and standardize,' and this body of knowledge 'might need some certification standards,' he said. However, Turner spoke mainly about what DPMA was and is doing and said little regarding a philosophical or practical position.

Glen Goldstraw observed that the Association for Systems Management had "traditionally been aloof" from DP, but this is no longer true. He said programming and other systems trends are now heading "away from one technical specialty," whereas certification "implies" just one specialty.

John Gottlieb, of ACM, reminded attendees that Cips members had declined to seek professional status, but that the issue was being reconsidered. There is a stronger trend toward certification in the British Computer Society than in the U.S. or Canada, he suggested.



CW Photo by Edward J. Bride

"... meaningless and useless trivia" — Campbell

during a recent conference conducted by the Special Interest Group for Computer Personnel Research of the ACM.

John Campbell of the Canadian Information Processing Society (Cips) said his society was "heavily weighted" toward management, which makes membership itself a "reward" for reaching a status in an organization.

"Certification is a big issue," he acknowledged, hastening to add that small groups exist on both sides, but the "vast majority" is waiting for a "reason to have a firm decision." A poll of Cips members elicited less than a 50% response, he noted.

Certification might be meaningless, since the level of acceptance "would have to be lowered" to permit recognition to those already involved in the

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THE NEWSWEEKLY FOR THE COMPUTER COMMUNITY

Editorial

The Invisible Man

Although it seems rare these days, there are still persons who do their jobs so efficiently and unobtrusively that no one really notices.

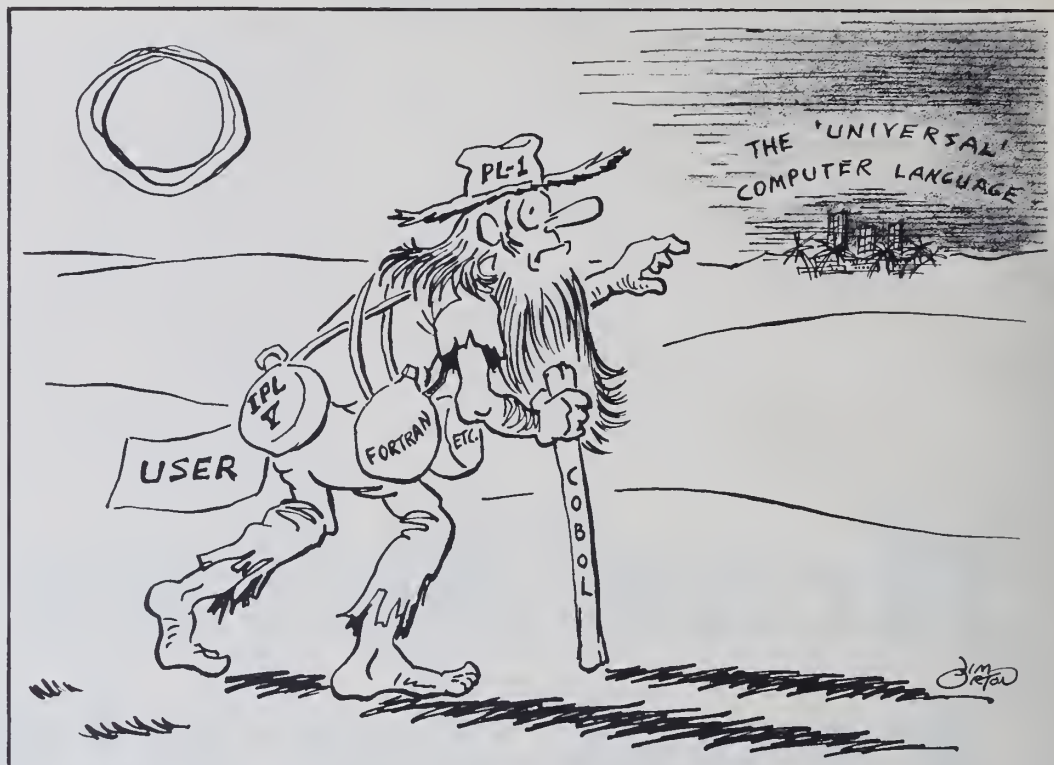
Many customer engineers fall into this category. The preventative maintenance they perform is usually taken for granted, and, when something does go wrong, they often materialize so quickly and fix the problem so unobtrusively that no one pays much attention.

Recently the IBM CEs got some unwanted publicity when IBM said they didn't have the training or tools to maintain 360s with memories extended beyond normal limits. What wasn't pointed out was that despite this handicap, the CEs, driven by professional pride, had been maintaining these 360s on a "best efforts" basis long before IBM even knew a problem existed.

Recently a reader wrote us, "Little, if anything, is published . . . that relates remotely to the area of service provided by vendor customer engineers . . . I would like to take this opportunity to salute . . . customer engineers throughout the industry for a job well done."

We join in that salute.

Ever Distant



Letters to the Editor

DP Service User's Role Vital to System's Success

In the May 10 Taylor Report, concerning his daughter's school report, Taylor and his correspondents seem to forget the role the user of outside computer services must play if the system is to succeed. While some of the criticisms (horizontal form design, juxtaposing course number and teacher name) are certainly justified, I would tend to blame the (ab)user for the following weaknesses:

- Teacher name — this field appears to allow for 12 characters. Who is to blame if the school secretary coded BUCKLEY rather than MR A BUCKLEY?
- Course name — here the system seems to allow 13 characters. Surely one cannot expect the marketing representative (or whoever) to tell the school authorities how to abbreviate their course names!
- Grade legend and verbal comments — a flexible system will allow the school to choose the legend and verbal comments in wants. Blame for the erroneous or unimaginative abbreviations should be assigned to those who deserve it.

The frightful appearance of Alison Taylor's report card casts a worse reflection on her school administration than it does on the analyst who tried to design a flexible system.

I also feel that the whole subject of where the system man's responsibility ends and that of the user begins (particularly in reference to outside computer services) is worthy of discussion and I would enjoy reading Taylor's comments

on this in a future column.

Allan K. Simon

Coordinator of Management Systems
University du Quebec a Trois-Rivieres
Quebec, Canada

Address for EDP Auditors

Can you please furnish me information regarding the EDP Auditors Association [The Taylor Report, June 7]?

I would like to contact this organization to find out more about its objectives, membership, etc.

W.J. Herr
Supervisor
DP Accounting

Monsanto Co.
St. Louis, Mo.

The EDP Auditors Association can be reached through Howard Friedman,

Northrup Corp., 1800 Century Park East,
Century City, Los Angeles, Calif., 90067.
Ed.

Bit vs. Byte Capacity

The article appearing in the issue of June 7 incorrectly quoted Univac 8460 Disk Storage Subsystem as offering the largest subsystem capacity in the industry. The article further stated that the 8460 can provide up to 2.2 billion characters of on-line storage. Since Univac systems utilize 6-bit characters, this translates into capacity of 13.2 billion bits.

The Burroughs B9484 - 4/B9485 - 4/B9486 - 4 Magnetic Actuator Disk Pack Drive Memory Systems contain 121 million bytes or 968 million fully usable bits of storage capacity per spindle. Since the BX 383 controller can allow up to 16

spindles to be attached in a single or dual/simultaneous configuration, a total subsystem would contain 1.936 million bytes or 15.488 billion bits.

Mark A. Lutvak
Manager, Product Analysis
Group III

Burroughs
Detroit, Mich.

Most users are more interested in byte capacity than in bit capacity, and the Univac system has a larger byte capacity. Ed.

Computerworld welcomes comments from its readers. Preference will be given to letters of 150 words or less. Letters should be addressed to: Editor, Computerworld, 797 Washington St., Newton, Mass. 02160.

Hardware, Software Don't Fulfill Doctors' Needs

By Tod H. Mikuriya, M.D.
Special to Computerworld

The current state of the industry does not allow feasible application of a stand-alone mini system to a physician's office. Neither hardware nor software are adequate for managing clinical files and doctor's office business.

The main hardware problems are:

- Too complicated — the devices contain too many functions that are not keyboard or program controlled.
- Too noisy — inadequate attention is given to dampening noise from tape drives, printers and cooling fans. This is not acceptable for the waiting room, and too distracting to patients. Also, very few secretaries work in sound-proofed closets.
- Too wasteful — I/O printers alone produce reams of unnecessary mandatory operational hard copy.

• Esthetically displeasing hard copy — no physician's office wants to present their correspondence looking like a gas or electric bill.

Current software tends to complicate, rather than simply, the doctor's office work.

The major software problems are:

- Excessively complex operations and programming — programs are not described adequately to be understandable to an intelligent secretary — or the physician.
- Absence of I/O format control routines — much of the secretary's time is

taken up filling out insurance forms, most of which ask for similar material in different locations on their forms, and forms may be either multiple or single sheets filled out on both sides. Programs have yet to be developed that allow the secretary to add or change a stored library of these excrescences without having to attend a programmers school or spend half

However, the prognosis is hopeful since as the hardware costs decrease and reliability and human engineering sophistication increase, eventually the smart stand-alone general purpose devices will allow feasible physician office placements.

Ignoring Market

Unfortunately, the megalithically oriented large corporations are currently ignoring this market and the small companies with inadequate funds are unable to develop application programs, so progress is temporarily being impeded. The technology is available but major industry-wide attitudes prevent expansion into this useful and lucrative market.

The nature of the physician in private practice is that he is independent and affluent, but he demands his dollar's worth. On-line systems are too vulnerable to failure and security leaks and are too expensive for storage.

If stand-alone systems with communications capability are made practical, we may look forward to the development of regional medical data banks, continuing medical education programs and faster transmittal of records among physicians.

These innovations could no doubt significantly enhance the delivery of health care services and improve the quality of the practice of medicine.

Dr. Tod H. Mikuriya, a psychiatrist in Oakland, Calif., has been a frustrated computer fan for years.

Viewpoint

a day's work in the process.

• Absence of communications compatibility — the state of the art is reminiscent of Africa with bands of tribes each speaking a different language. These tribes, Ascii, Ebcidic, BCD, Teletype code languages, combat each other for dominance but nobody wins. Transmission rates of 9,600, 7,200, 4,800, 3,600, 2,400, 1,800, 300, 150, and 110 bit/sec; Full Duplex, 1/2 Duplex, Simplex, Sync, Async, Telpac 40.8 Kbits, all contribute to expensive unnecessary confusion.

• Failure to develop flexible user oriented programs — the big companies have a "take it or leave it" attitude with their program packages. They force the user to conform to their routines rather than offer programs flexible enough to adapt to user needs without expensive modifications. The small companies have no or minimal software to offer and no money for application program development.



Should DP Applications be Audited - Or Inspected?

The function of auditing normally is to ensure an operation is working correctly. Whether the entire data processing operation can ever be certified totally correct is not known. A number of data processing practitioners have expressed major doubts on this question.

One group that had many such doubts was the Executive Council of the Society of Certified Data Processors, which recently discussed the implications of the proposed society draft coat of arms [CW, May 24].

This Coat of Arms illustrated the idea that a CDPer would be able to take an application, and the SCDP rules, and then put a "seal of approval" on the operation.

During the discussion it became clear this plan will not always work and there were major dangers involved. The prime danger was that something could occur which would wreck the application, and still not have been caught by any of the

standards.

Clearly, the idea of placing an SCDP "seal of approval" on such an application was not attractive!

Inspection Not Approval?

One alternative broached was that instead of giving a seal of approval, a CDPer would merely state that the particular application had been checked in some particular way. This is not so much an audit (which is supposed to be complete) as a type of inspection. It would work in the same way, for example, that the quality of the meat on your table is inspected.

The federal meat inspection does not guarantee there is nothing wrong with the meat. It merely guarantees that the inspectors have looked at the meat and found nothing that violates the federal standards.

The strength of the inspection is in the strength of those standards — no more and no less. If a piece of meat in fact is bad, or a form of standards is inadequate, then it is still up to the meat buyer to reject it.

The user advantage of the federal inspection is that it reduces the amount of work involved in meat buying, and makes it practical for the buyers to concentrate some of their attention, and their knowledge, on other

elements involved in the selection. This in turn widens the number of people who can be safely trusted to buy meat — which helps the meat sellers also.

DP Purchasing Complex

Compared with meat buying, data processing purchasing is a

Altogether it looks as though inspection, rather than auditing — certificates rather than seals of approval — are what is really appropriate in an EDP field. It also looks as though inspection would be useful and easier to obtain.

very complex operation. I think that anything which helps reduce the amount of work involved is good. And so inspection — as opposed to approval — is certainly an item which might well be useful if it can reduce the work, widen the market, etc. But what would its output be?

Output of DP Inspection

As far as I can see, the output would be a certificate that a particular application had been inspected in accordance with some particular standards, using particular standard inspection methods, and that the findings had been such-and-such.

This certificate would carry no specific approval — but the lack of a certificate (when one could have been obtained) would itself tell a potential buyer something he might be interested in knowing, and certainly would tell him where to look.

The physical form of the certificate then would not be in accordance with the draft art of the coat of arms which showed a seal of approval, but would simply be a "certificate of inspection."

Who Can Inspect CP

The validity of the certificate would of course continue to depend — as the validity of the approval would depend — upon the known capabilities of the person signing, as well as the characteristics of the standards involved.

According to our recent polls about the desirability of a CPA-like certificate it seems a great majority of data processors feel a person should have both experience in DP, and have passed a professional level examination, before he can be accepted as competent to sign such a certificate.

As the CDPers are currently the only group whose single qualification shows them to have both these characteristics, it looks as though it would still be practical for them to sign such a certificate. But that is a question for you, not for me.

Easy to Start

Of course it would be nice to have a real DP audit capability — but if it means having to wait until we are able to certify an application as being "approved" then it may have to wait a long time.

Inspection, by contrast, appears to be something that could be started immediately after certain points are agreed to be improper. This should not take long.

One of the results of the SCDP experience with its Unprofessional Practices Committee is that we found that agreement that certain items are wrong is a

lot easier to obtain than any agreement as to exactly what is correct!

Moreover, deciding inspection standards, and what to do in the case of tests failing, is an area which can often be left to non-technical decision makers, thereby reducing the costs involved in

field. It also looks as though inspection would be useful and easier to obtain.

The question remaining is whether or not an inspection certificate could be of value in pulling up data processing standards.

You have previously told me a CPA-like certificate would be of great value. Now would you also give me your opinion as to whether a Professional Inspection Certificate would be of value (assuming the standards concerned are equally valid)?

setting up the standards.

SURVEY OF PROFESSIONAL OPINION ON THE VALUE OF AN EDP PROFESSIONAL LEVEL INSPECTION CERTIFICATE

1. How valuable would a professionally given Certificate of Inspection be in improving professionalism in data processing?
() No Real Help () Some Help () Great Help
() Other _____

2. Would a person, qualified by professional level examination and experience, be needed to sign such certificates?
() Yes () No () Other _____

3. What would be the first three areas within EDP that you feel should have inspection standards?

(1) _____

(2) _____

(3) _____

When completed, please mail to Alan Taylor, c/o Taylor Reports, Computerworld, 797 Washington St., Newton, Mass. 02160.

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CDP? Yes () No () SCDP? Yes () No ()

Inspection Way of Future

Altogether it looks as though inspection, rather than auditing — certificates rather than seals of approval — are really what is appropriate in an EDP

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Is This the Proper Way To Handle DP Complaints?

"As far as course names are concerned, it is pretty apparent that more space is available for course names than is actually being used. I don't think that you should criticize ECS for this because I am sure that this matter is under the control of the administrator responsible for data processing in the school."

"Teacher name field should perhaps include title and initial. However, if it did so, would the report card fit in a standard envelope for mailing or taking home? I don't think that most parents would be interested in receiving a 14 in. by 11 in. report card and some of your suggestions would tend to stretch it out that far."

"In the verbal comments field, if invalid coding by the staff does not lead to a lost comment, what should it lead to? A comment that says 'Staff Errors'?"

These are three of the points raised in defense of the particular service company that produced the school report, reproduced here recently. They are interesting because they were proposed by a director of a different — and somewhat competitive — service company which also produces school reports.

The points may or may not be valid. What interests me is the method used to criticize. For example, his comment that "I don't think that you should criticize ECS for (wasting space)" suggests that I had criticized ECS — as opposed to the school administrator. I had not.

And his use of a rather ridiculous answer to the perfectly valid question as to what should happen when an invalid comment code was entered is also questionable.

Obviously, the print-out "Staff Error" would not be acceptable to the school. But there are many other possible choices. A service could note invalid cases at the beginning of the run — and list them for the school to manually create.

Or it could re-run with corrected input after the main run.

The suggestion that there is no better alternative than losing

Taylor Thoughts

comments — because one alternative would be more undesirable — is not the answer. It is simply a red herring.

Even more of a red herring is the suggestion that a large (14 in. by 11 in.) report card would result from adopting the various suggestions. The director does not exactly say that it would be needed, anymore than he exactly said that I criticized ECS, or that I said invalid coding should produce a print out "Staff Error."

He just says that the adoption of the suggestions will "tend" to stretch it out that far. Well, perhaps it would in some designers' hands — but there is absolutely no need for it to do so! In fact, they can all be accommodated on the current size of report form.

I don't believe the use of such techniques of diverting attention from the point at issue are helping the data processing image at all. Unfortunately, I see this type of evasion too often. Can't we simply answer the public's problems with DP without resorting to imaginary dangers to alibi us out of our errors?

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To Aid Black Lung Detection

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LOS ANGELES — A new product of computer-age color video may soon join the medical profession in an all-out war against lung disease.

University of Southern California (USC) research engineers are refining a system which converts black-and-white X-rays into full-color photographic images that they say are clearer than the original.

The lung X-rays are analyzed by computer and reconstructed in multiple gradations of color by a video imaging system called Spectrovision. Produced by Aerojet-General, Data Systems, the USC Spectrovision unit is the first model to be used in fields outside space research.

Under a grant from the National Institute of Occupational Safety and Health (NIOSH), the color enhancement system is being used at USC to explore "textural discrimination" techniques for early detection of pneumoconiosis.

The lung disease also known as "black lung," is caused by continual breathing of dust particles. It produces small nodes on lung tissue and is often extremely difficult to detect in early stages.

Frequently, early stages of lung node growth are imperceptible in the gray tones of an X-ray.

These subtle gradations of gray are converted into multiple gradations of color hue, color saturation, and luminance.

Black-and-white photos such as X-rays, says Dr. Richard P. Kruger, principal investigator under the NIOSH grant, provide no information at all for two-thirds of the visual faculties. The eye is restricted to degrees of gray, or luminance.

Color conversion restores the properties which the eye sees as hue, chromatic variety, and saturation, or vividness of color. The converted image therefore contains more overt information.

In the case of chest X-rays, the converted color image enables a physician to detect subtle differences in areas of nearly constant tonal density.

The human eye can't distinguish more than 20 variations of gray at best. With color enhancement, the viewer can detect about 50 tonal variations, plus many more combinations inherent in changing background color combinations.

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Century 114 Disk	Model 4046, 4057 & 4054A, 12 3M words, DOS requires 12K core minimum.	\$ _____	Model 3160A, 14 5M words, DOS requires 4K minimum.	\$18,500	
DISK CONTROLLERS					
Diablo Disk	Model 4047 & 4046 adapted for two drives.	\$ _____	Model 3150 for four drives, overlap seeking, multiple sector transfer	\$ 3,850	
Century Disks	Model 4057 & 4046 adapted for four Century 114, 2314-style drives.	\$ _____	Model 3160 for any eight Century 114, 214, 215, 2314-style drives, UL approved.	\$ 8,000	
TAPE SYSTEM					
Wang	Model 4030J and 4030, 45 ips only	\$ _____	Model 3120A, 12.5 to 45 ips, 7/9 track intermix.	\$ 7,200 to 8,400	
TAPE CONTROLLER					
Wang	Model 4030 and 4035 adapted for one Wang 1045 drive.	\$ _____	Model 3120 for four Wang drives, 12.5 to 45 ips, 2/3 character per word option, PEC Compatible.	\$ 3,900	

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Researchers Resort To COM for Search, Update Information

ROCHESTER, N.Y. — How can a scientist keep track of what his colleagues in his own research complex have studied — to say nothing of what is happening in related research by others around the world?

Eastman Kodak information scientists here have coupled microfilm with a computer to provide the answer. This basic approach is embodied in two systems, the first containing complete references to some 40,000 company scientific reports.

A second file, currently containing references to some 4,000 patents and a few selected literature references, will eventually provide access to a major portion of the world's photographic patent literature.

Both systems interact with the Kodak Research Laboratories' automated chemical index and related data files.

To Help Accuracy

Several problems are common when indexing and searching patent literature and research reports, according to Kodak. These indexing problems are aggravated in documents dealing with imaging systems because many scientific disciplines contribute to the evolution of a product. To help cope with these problems, the method of indexing is built on the following foundation:

- Technically trained indexers familiar with the scientific subject matter are utilized, so that they will recognize important concepts and relationships regardless of how the document is written.

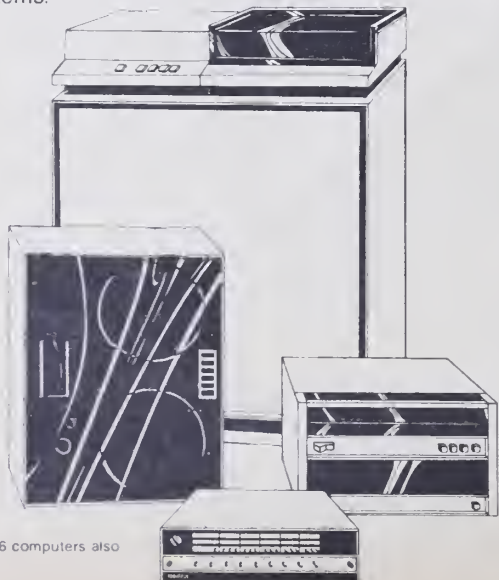
- Accessing index terms are taken from a controlled thesaurus of well-defined words and relationships to obtain a high degree of consistency in the descriptions.

- Descriptive words — descriptors — are further categorized by "role," to indicate the context in which they appear in a particular document. For example, role 2 indicates that the reference contains a particularly good state-of-the-art review of a subject, while role 3 means the document describes a way of manufacturing a product.

- The important chemical compounds in each reference are indexed, using a highly versatile topological representation and a chemical fragment code system.

Anywhere from 10 to more than 100 descriptors may be used on a single patent by the indexer. Thus the resulting deep subject index can also double as an abstract of the patent, when used by someone familiar with the thesaurus.

The result: indexing and bibliographic data are keypunched and put onto computer tape so they can be processed to yield microfilm listings.



*DCC 116 computers also

Random Notes

'Total', 'DLI' Data Bases Accessed by PMI's 'Score'

NEW YORK — The Score file management system now can be used to access DLI and Total data bases, according to Programming Methods Inc. (PMI).

The PMI system is said to permit access of any non-standard Cobol data base through the insertion of user-generated interface routines into the Score-generated Cobol program. This makes all the retrieval and reporting capabilities of Score available to users of Cincom System's Total or IBM's IMS, PMI said.

Translation System Extended To Handle Easycode-Cobol Shift

LOS ANGELES — An updated version of the Autocoder to Cobol Translation (ACT) system, from Associated Computing Services Inc., is said to support translation of 1440, 7010, and 7080 Autocoder, and Honeywell Easycode to Level D, Level F, or ANS Cobol, with 90% to 95% effectiveness.

The Disassembler package is a subset of ACT which can produce source code from a user's object program, in order to process it with ACT itself. The ACT package costs \$30,000 but its capabilities are available on a service basis, the company, located at 12011 San Vicente Blvd., 90049, said.

Beverage Distributors Get Help

LOS ANGELES — Beverage distributors in California have begun using a remote entry reporting system developed through the time-shared facilities of Beverage Systems Inc. (BSI). The system allows users to get monthly statements in the mail within 24 hours of closing their books, BSI claimed.

It also provides a range of management reports, and all the required state and federal filing forms. The management reports include truck loadings, inventory controls, and sales and market analysis. BSI is at 6701 S. Sepulveda Blvd., 90045.

Pacer Put on 370 Under TSO

HANOVER, N.H. — The Pacer 245 system for chemical and petroleum process simulation has been adapted for use on the IBM 370/155, according to the developer, Digital Systems Corp. (DSC).

A modification of the 1966 implementation, the 370 package requires a 128K byte region, and is available on a rental basis for \$12,000/yr. DSC can be reached through P.O. Box 986, 03755.

Most 'Generators' Aren't

Test Data Creation Problems Cited

By Don Leavitt
Of the CW Staff

WASHINGTON, D.C. — Many DP managers have developed reasonably good theories about controlling software development, but these theories tend to break down at the program testing stage.

There may be several reasons for this, Michael R. Barrett told a recent U.S. Army ADP symposium, but the primary problem is in the creation of test data.

Barrett, a member of the Army's Computer Systems Support and Evaluation Command, noted that the conventional and continuing use of existing data sets, selected records from existing data sets, or data sets created from hand coded test data has limited validity. On the other hand, some 'test data generator' packages are equally poor in Barrett's view.

Preexisting and perhaps undetected error conditions and lack of complete data types to test fully a new or revised program's logic were cited as hazards of depending on existing data sets or "sample" data sets created from current files. Hand-coding is cumbersome and error-prone, Barrett added.

Among the test data generation packages, there are three types, according to Barrett:

- "Repeaters," or packages that are only capable of repetitive data generation with little control, "offer the user few options in defining the dimensions of a test data set."

They generally will not accept user code and are limited in record formats they can generate, he said.

- Media-to-media copying/reformatting software, better than the repeater type, is still "defective" since it requires at least one input item for the generation of each output item. Although it allows the build-

ing of user-specified output data sets, the effort needed to use these packages approaches that needed for hand coded test data.

- True test data generators should be able to produce data to exercise all basic subroutines of the program being tested, through a "highly flexible" set of control parameters.

These controls should allow formatting at both the file and record level, Barrett noted, and one control card may cause creation of multiple records.

Generators that utilize the data descriptions from the Cobol source modules of the programs being tested require only controls needed to define the data content of fields to be generated; the file and

record structures are predefined.

Generators that require coding of these structures are generally limited to the creation of one test data set per run of the generator, Barrett said.

Some vendors have implemented a test data generator in the assembly language of the host CPU and use special features of the machine's operating system. This approach clearly rules out easy conversion of the generator logic to other CPUs, he said.

A better approach, and one that has been followed by at least one supplier, is to code the generator itself in ANS Cobol, so it can be transferred, Barrett added.

Computer Sciences Now Testing Operating System for 'Infonet'

LOS ANGELES — Computer Sciences Corp. (CSC) has completely rewritten the operating system for its Infont time-sharing service, to provide users with more complete, and flexible facilities than they have had up to now. The Computer Sciences Timesharing System (CSTS) software is currently undergoing final test before being installed throughout the network.

Each of the four CSC centers, using CSTS, will be capable of serving "several hundred" simultaneous users with interactive processing, while concurrently providing several priority levels of multiprogramming batch processing submitted over data lines or over the counter at the center.

An integrated system architecture is said to permit interactive and batch users to

share identical facilities and make use of the hardware and software resources of the system.

CSTS is built around several subsystems intended to permit the coexistence of tailored computing environments for the several kinds of network users, CSC said.

The Basic subsystem, includes a new incremental compiler, integrated with a "comprehensive" command language and program checkout tools.

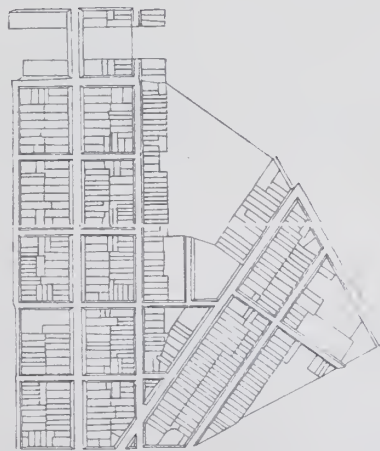
The General Programming Subsystem (GPS), is for the more sophisticated user. The command language is more extensive and includes ANS Cobol with extensions, and dual ANS Fortran compilers, for optimizing compilation time or object code, as well as an assembler with macro-instruction capabilities.

Service Interfaces User Files and U.S. Census Data

CAMBRIDGE, Mass. — DP managers concerned with analysis of urban data, maintaining mailing lists, market research, urban information systems, or deriving demographic profiles of their company's customers, can get help based on official 1970 Census data, through the services of Urban Data Processing Inc.

Urban's specialty is processing data where the geographic aspect is important. The staff was responsible, a spokesman said, for fundamental developments in computerized geographic coding, and pioneered two major geocoding advances for the U.S. Bureau of the Census: Address matching, a street address matching program, and Dual Independent Map Encoding (Dime), a computerized rendition of a city street map.

Address matching, the company explained, refers to the ability to identify



A computer-generated census tract map based on Dime file data.

which census tract each of the user's customers live in, based on their street addresses.

Once the census tract identifier has been included in the customer records, users can search records for customers in tracts with specific, desirable characteristics.

Urban also serves as a Census Summary Tape Processing Center and, as such, will produce copies and displays of census tapes at, or below government prices, a spokesman said.

1970 Census data is 30 times as voluminous as 1960 data, and Urban will create special tapes combining 1970 data with customer's own data, he added.

Cost of Urban's services vary according to user needs and the condition of the user's files. Urban is at 552 Massachusetts Ave., 02139.

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JULY 26 ISSUE



Particular interest will be paid to the equipment that makes Data communicate: Modems . . . Multiplexers . . . Front End Processors . . . Communications Terminals . . . Communication Dedicated Minis.

Equipment selection processes will be discussed as well.

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DATA
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Data Briefs

Codex Has TDM Multiplexer For Use Inside Modems

NEWTON, Mass. — Codex Corp. has introduced a time division multiplexer which can be incorporated into its 4,800, 7,200 and 9,600 modems. The device includes buffers for up to four channels that allow the Codex modem to service multiple lower speed synchronous modem connections.

The built-in multiplexers can handle speed inputs ranging from 1,200 to 7,200 bit/sec and can "compact" up to 9,600 bits of data in the same bandwidth that previously accommodated 2,400 bits, Codex said. The multiplexer fits on a plug-in circuit card and is priced at \$2,000. It is available in 30 days from 15 Riverdale Ave., 02195.

Intertel Has 202-Type Modem

BURLINGTON, Mass. — A modem which provides full Bell 202D compatible operation at speeds up to 1800 bit/sec on two- or four-wire private lines has been introduced by Intertel, Inc.

The Model 2026 features include carrier turn-off and clear to send delays which are strap selectable for fast turnaround or Bell compatible operation, and mark hold on received data when carrier is lost. The modem operates at speeds up to 1,200 bit/sec on unconditioned 3002 lines, up to 1,400 bit/sec on C1 conditioned lines, and up to 1,800 bit/sec on C2 conditioned lines. The 2026 costs \$310 from 6 Vine Brook Pk., 01803.

Terminal Replaces TTYs

BURLINGTON, Mass. — Computer Devices, Inc., has introduced the Model 930 data printer terminal.

Designed to replace terminals and CPU consoles which use teletype-writers, Selectric or similar mechanisms, the Model 930 Teleterm price is \$2,700.

The 930 uses a solid-state, non-impact printer to gain a speed advantage of 3-to-1 over Teletype equipment, printing at 30 char./sec. The firm is at 9 Ray Ave., 01803.

103GM Modem Has Loop Test

COLUMBUS, Ohio — Design Elements Inc. has introduced a 300 bit/sec modem designed to operate with teleprinters, CRTs, and similar devices. The 103GM incorporates features of the Bell 103 data set and the unit is compatible with Bell 101, 103, and 113 series, the firm said.

The data set is available in originate, manual answer, and automatic answer modes. It includes a loop-around test for remote check out of the terminal. The 103GM costs from \$350 to \$500 depending on options. It is available in 30 days from 1356 Norton Ave., 43212.

Firm Has Auto Call Unit

MAHWAH, N.J. — Data users can operate five to 20 communications lines unattended under CPU control with a 1,200 bit/sec automatic calling and answering unit developed by Teleprocessing Industries, Inc.

Designed as an alternative to dedicated communications systems, the unit allows computers to make and answer calls automatically over the dial-up network. The Model 1200 costs from \$10,000 to \$35,000, depending on features.

The company is at 82 McKee Dr., 07430.

Input From Anywhere

Portable Terminals Ease Data Entry

By Ronald A. Frank
Of the CW Staff

EL MONTE, Calif. — A technician parked his car near an intersection in this city recently, carried a suitcase up to a control box on the corner, and adjusted the traffic lights by sending data to a minicomputer.

While this sequence of events sounds unusual it is becoming commonplace and the equipment in the suitcase makes it possible. More and more users are accessing computers from virtually any location with a telephone, by utilizing portable data terminals.

Most of the terminals have acoustic couplers that can easily be used with a telephone. Some have full keyboards and

produce hard copy paper printouts while others have small CRTs for displaying data.

In the California example, Multi Sonics Development Corp. is helping the city of El Monte optimize traffic flow on its streets. Up to 32 lights can be controlled by a special multiplexer on two private line wire pairs, according to C.R. Stevens, president.

The portable terminal allows a technician in the field to observe traffic patterns and then adjust control programs stored in a GRI 909 minicomputer. To access the computer, the technician connects the telephone handset in the control box to an Envoy terminal made by Applied Digital Data Systems Inc.

After first displaying the intersection's control program on the terminal's five-in. CRT, the technician can enter the proper codes onto the terminal keyboard to change the intersection "parameters" in the mini, Stevens said.

The portable terminal can be used to modify such data as the amount of time that a light remains green or the timing relationship of the lights in one intersection with those of another intersection. The portable terminal enables on-site modifications based on observed traffic patterns, Stevens said.

The Envoy costs about \$3,400 or from \$100 to \$175/mo depending on display size. The CRT allows off-line editing and the screen can be formatted to meet the needs of the user.

Other Users

At the Carter Products Research division of Carter Wallace Inc. in New Jersey, Giles Crane, a statistician, uses an Execuport terminal to access the Applied Logic Corp. Al/Com time-sharing network from his home.

Crane says the terminal, from Computer Transceiver Corp., lends itself to remote usage because it can handle 30 char./sec, and is quiet with its thermal printer. Crane uses the terminal with a Techtran Industries Inc. 4100 cassette unit for "off-line" storage of programs to save on Al/Com connect time charges.

The thermal printer does limit the user to single hard copies while an impact printer would eliminate this but the thermal unit on the Execuport "can't be beat" for reliability, Crane said.

The addition of the Techtran cassette was accomplished via the EIA-compatible plug on the back of the terminal, he said.

Moth Update

In Connecticut, the U.S. Forest Service uses the Porta Com terminals made by Data Products Corp., in Stamford, to monitor the gypsy moth population. The moths are basically uncontrolled with few natural checks and balances, according to one spokesman.

With the Porta Com units, field crews are able to update data bases at university DP centers such as Yale where the Forest Service enters its data on a 360/67.

The Porta Com includes an impact printer and EIA plug for the attachment of a cassette unit and other "peripherals." The terminal transmits at 10 char./sec and costs \$1,650. A cassette unit is available for \$1,450.

At Hoffman La Roche Inc. in New Jersey, the use of portable terminals allows programmers to access the in-house HIS 635 CPU during their most productive periods, according to Ted Givand, operations research specialist.

Programmers developing management information and scientific software can enter Fortran IV instructions directly into the CPU via the portable terminals, Givand said. The software development was described as related to interactive "decision aids," and the programs are being written for chemical production and planning personnel, he said.

About 20 people at Hoffman-La Roche use the Execuport unit from remote locations and the concept is growing in popularity, Givand said. One benefit of the terminals is that the user can access the CPU during off-peak hours without having to waste time during the normal work day, Givand said. The terminal costs about \$3,800 or \$155/mo on a one-year lease with maintenance.

Acknowledging that the use of portable terminals is still in its infancy, Givand agreed that today's work-oriented users are probably the forerunners of persons who will access CPUs from their home for leisure and personal pursuits.

Tec CRT Handles Dual Speed Data Flow to Optimize CPU

TUCSON, Ariz. — A CRT communications terminal that has the capability to operate at separate transmit and receive speeds is available from Tec Inc.

The CRT is designed as a "silent TTY replacement," and is compatible with most common interfaces, the firm said.

The Model 440 Data Screen terminal features 10 discrete crystal controlled speeds from 110 to 9,600 bit/sec which are independently selectable for receive and transmit operations.

The dual speed operation allows the entry of data at the CRT keyboard at slow rates matched to the speed of the operator while higher speed outputs from the CPU onto the CRT screen can be transmitted without having to worry about any operator interaction, a Tec spokesman said.

The advantage of the high-speed output from the CPU can be demonstrated in that a CRT-display containing 1,920 char. could be transmitted in two seconds. If the output were limited to input key

entry speed, it would take "several minutes to fill the screen," a spokesman estimated.

In order to utilize the dual speed capability of the 440, the user has to connect a matching dual speed modem. While several vendors have announced modems with the required characteristics, it is believed relatively few have been installed by users. Intertel Inc. has several modems that can handle dual speed operation.

To simulate the paper feed motion of a teleprinter, the 440 features a bottom line data entry and line feed. A nine-pin connector allows the use of an on-line printer when a hard-copy output of the display is required. The CRT terminal has a switch-selectable 72 or 80 char./line display and all graphics are generated in a 5 X 7 dot matrix on the 12-in. screen.

The 440 is priced at \$2,245 for the full terminal. A unit without the keyboard saves the user about \$300. Delivery of the CRT is 90 days from 9800 North Oracle Road, 85704.

Design Software Simulates Best Data Networks Based on Traffic

JENKINTOWN, Pa. — A telecommunications network design package that simulates optimal traffic flow in a data network is available from Analytics Inc.

The Communications and Information Network Simulator (Cains) is designed for use on networks with a minimum of 15 to 20 nodes (terminals), a spokesman said.

The package is meant for use in an interactive mode and is directly compatible with Burroughs 5500 and HIS 635 systems. But some minimal changes in file statements can adapt Cains to 360 systems, the PDP-10 and similar systems, the company said.

Cains is written in Fortran IV and has the capability to simulate message distribution characteristics and data traffic through various nodes in a projected communications network.

Unlike similar packages, Cains concentrates on optimal message handling based on total transmissions, rather than determining the least cost mileage in a network, a spokesman said. The package can simulate more than 300 node points and several hundred inter-node links.

Although Cains is now limited to the consideration of traffic pattern characteristics, enhancements under consideration include the addition of cost data and parameters for estimating error correction.

The package is available for \$5,500 which includes "one manweek of consulting time for installation and instruction,"

the firm said.

Cains is also available on most major time-sharing systems at normal connect rates. Analytics Inc. is at 179 Washington Lane, 19046.

Terminal Controllers Reduce TTY Downtime

MAHWAH, N.J. — Model 35 teleprinters equipped with solid-state selectors (terminal controllers) designed to reduce downtime on private wire terminal systems through built-in diagnostic capabilities are being offered by Western Union Data Services Co.

Called the Computer Controlled Terminal (CCT) 35, the unit is a replacement for such half-duplex systems as the Bell System's 8A1 and 85A1

The ASR configuration includes the following features: preparation of tapes of incoming messages; transmission of previously prepared tapes; off-line preparation of tape; character counter; mode switching control; and automatic tape reader controls.

The price of a typical CCT 35 (not including the selector) with friction feed, equipped with a typing reperforator, starts at \$120/mo. Deliveries are within two months. The Bell System's interstate tariff rate for similar equipment is \$21/mo more, the company said.

System/3 Disc Cartridges \$105 each.

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New Nashua 4440 Disc Cartridges are now available to members of Group/3, the System/3 users group, at a price far less than anything available. Just \$105 plus freight. These widely-used cartridges meet or exceed all known IBM specifications. Available for immediate delivery. If you're not a Group/3 member, the coupon below will solve the whole problem.

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Bits and Pieces

Disk System for H316/516 Introduced by Data Disc

SUNNYVALE, Calif. — A disk memory system for Honeywell 316/516 minicomputers has been announced by Data Disc, Inc. The 1737 is a head-per-track disk memory with capacity available in five levels from 64K to 1M words. The average access time is 16.7 msec, and the average data transfer rate is selectable in four increments from 8 to 64 μ sec/word.

The 1737 connects to the computer on either the I/O bus or the DMC channel.

The 1737 System is priced from \$10,425; delivery is 45 to 90 days from 686 W. Maude Ave., 94086.

Alden Unit Makes Hard Copies From Tektronix CRT Displays

WESTBORO, Mass. — Alden Electronic & Impulse Recording Equipment Co., Inc. has announced its Model 600 "Push to Print" Hard Copy Recorder.

This recorder utilizes a facsimile recording technique to provide 6-in. wide hard copy recordings from Tektronix CRT display terminals. Recordings are generated on electrosensitive paper at 30 line/sec.

The recorder is compatible with the Tektronix Type 611 or Type 611 Mod 162C bistable storage tube display. It costs \$2,500 and is available on 60 day delivery from Alden Research Center.

Option Added to Burster

DAYTON, Ohio — The Standard Register Co. has added the Series 1500 Folder/Glue attachment to its Series 1500 Forms Burster.

The steel unit (9 in. high by 23 in. wide by 14 in. long), which has its own glue supply motor, provides a method to fold and glue single-copy continuous forms or to collate and join two separate copies prior to a bursting operation.

The motor receives its power from the burster's auxiliary receptacle and is automatically synchronized to the speed and start and stop functions of the burster.

The units are available immediately at \$835.

Smaller Pieces

The Engineered Magnetic Division of Gulton Industries, Inc., Metuchen, N.J., has developed the EMNB No-Break Power System to supply continuous or standby power for computer installations.

A cylindrical polyethylene container for short punched paper tapes is available from the Herbert Shprentz Co., Irvington, N.Y.

By Frank Piasta
Of the CW Staff

ST. PAUL, Minn. — A head crash can not only cause serious damage to the disk pack involved, but also damage the heads so they lose their ability to fly. This would damage every other pack used on the drive.

A common cause for crashes is a pack that has been accidentally dropped or bounced, changing the physical characteristics of the pack, Harlan Vergin, 3M's technical service supervisor for disk packs said in a recent interview.

Many users have the impression that a pack is a relatively solid piece of equipment when in reality it is quite fragile, Vergin, who "troubleshoots" pack problems, explained.

A slight change in the position of a disk can cause serious problems because the heads normally have only a few micro-inches of clearance, Vergin said.

The user who notices that a particular drive/pack combination is producing a high number of errors, should take both the drive and pack out of service until both can be inspected for damage, Vergin recommended.

He said a crash can be heard if listened for, but added that this would be difficult in the typically noisy computer room.

A red light that would come on, or a bell that would ring, if a crash occurs would be helpful, Vergin believes. However, he was not aware of any drives available that are equipped in this manner.

In the absence of a more positive control, Vergin recommended that the drive be stopped immediately if anything suspicious is noticed.

Another common cause of pack problems is improper labeling, Vergin commented. The only recommended labels are circular ones designed to fit inside the "trim ring" on the top of the pack, he said.

Labels applied to the top or bottom disks are liable to be dislodged through centrifugal force and interfere with drive operation, he explained.

Embossed plastic labels were specifically not recommended. They could rub against the top canister cover and transfer contamination to the pack, he said.

A program of disk pack inspections at regular intervals, perhaps every 30 days, should be instituted by users, Vergin said.

The inspection should include checking the disk surfaces visually for dirt, scratches and bumps. Particular attention should be paid to the "0" and "19" surfaces at the ends of the pack as these are most susceptible to damage, according to Vergin.

Other items that should be checked include the pack filter for dirt and the "0" ring for damage. An area frequently damaged is the male lock assembly which can be stripped by being "cross-threaded" during pack mounting, Vergin added.

3M has taken no stand on the use of disk pack cleaning machines, Vergin said. Personally, he feels the use of such a device could be helpful in disk pack maintenance. This would especially be true in installations equipped with drives without a "brush cycle" that sweeps the disk surfaces before the heads are flown.

Drum Printers for Major CPUs Offered by Independent Firm

GARDENA, Calif. — A line of five models of printers is being offered to large and small computer users by an independent supplier, Macro Products Corp.

The printers, complete with interfaces to such full size computer systems as Honeywell 200; IBM 360, 1440 and 1620; Univac, and Burroughs; and minis by Honeywell, DEC, Hewlett-Packard,

Data General and others, offer print speeds from 245 to 1,800 line/min.

The drum printers manufactured by Data Products Corp., are available with 80 to 132 character lines. Standard character set is 64, with 86 and 96 character sets; Printers available include:

- M310 — Print rate is 356 to 1,110 line/min using an 80 character line. Buffer size is 20 characters.

- M410 — Print rate is 245 to 1,110 line/min using a 132 character line. Buffer size is 24 characters.

The remaining three models offer a 132 character print line and a full-line buffer. The principal difference is in printing speed.

- M420 — Print rate is 245 to 1,120 line/min.

- M440 — Print rate is 700 to 1,800 line/min.

- M470 — Print rate is 1,250 to 1,800 line/min.

Prices for the 80 column printer complete with interface, installation and training begin at \$10,750. The 132 column models start at \$13,125. Delivery is 60 to 120 days from 14403 Crenshaw Blvd., 90249.

Interdata Computers Gain Dual Tape Cassette System

OCEANPORT, N.J. — Interdata, Inc. has announced its Intertape Cassette System, with a single unit list price of \$4,200 and first deliveries scheduled for August, for its 70, 80, 50 and 55 CPUs.

The dual transport Intertape offers 1M byte of low cost, sequential mass storage. The Intertape system features hardware read-after-write check, and a tape speed of 10 in./sec.

Interdata is at 2 Crescent Place, 07757.

Turnkey Systems Aid Newspapers

LONDONDERRY, N.H. — Two mini-computer-based turnkey systems for newspaper use have been developed by Hendrix Electronics, Inc.

The CDS/4000 Computer Display System is intended primarily for small to medium sized newspapers as well as for commercial printers and typesetters.

It is based on a CRT-equipped terminal with a built-in computer, two mag tape cassettes and a keyboard.

The larger Text Publishing System is designed for use by larger papers and is built around a controller with a DEC PDP-11 and from one to eight CRT terminals.

The CDS/4000 offers processors with 4K to 16K byte memories. It can be used as a stand-alone or on-line text editing terminal, or as a control system in a batch processing operation.

A keyboard with both alphanumeric and TTS (teletypesetter) symbols is provided. Up to 10 peripherals can be attached including phototypesetters, paper tape readers and punches, mag tapes, disks, line printers and modems. It can be attached directly to a news wire, the company said.

Software packages providing editing,

correcting and classified ad handling are available.

Under development are typesetting, and business programs such as payroll, accounts receivable and circulation. Prices start at \$11,500 with editing software and a paper tape reader and punch.

Intended for use in inputting editorial and classified material directly to on-line typesetters, the Text Publishing System includes the necessary software and EDS/5700 CRT terminals to control copy preparation from beginning to end, the company said.

The basic system including the controller with an 8K PDP-11, CRT display and software is priced at \$16,900. Additional terminals cost \$5,400 each.

Delivery is 45 to 60 days.



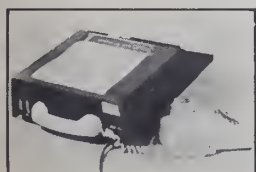
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Software Heads ACM '72 Topics

By Edward J. Bride

Of the CW Staff

BOSTON — The computer community has been celebrating various anniversaries for two years. Last year was the silver anniversary of computers, and next Aug. 14-16 will be the silver anniversary conference of the Association for Computing Machinery (ACM).

A highly technical, software-oriented program has been arranged by the various special-interest groups and committees. A total of 45 sessions will be conducted in this area, each with at least two papers, officials noted.

'Commercial Program'

ACM has followed other organizations in eliminating equipment exhibits, and will permit vendors to conduct a "commercial program" on the state-of-the-art of computer software.

The program will consist mainly of descriptions of product lines, and will be "sales oriented," ACM conceded, adding the presentations will be "in sufficient technical depth"

to be valuable to conference attendees.

There will also be a Feature Session to open the conference Aug. 14. Conducted by John Donovan, chairman of the Technical Program Committee, the subject will be current research in computer science.

Chess, Venture Capital Too

In the less technical area, there will be a session in the commer-

Societies/ User Groups

cial program on venture capital. Industry figures from the computer and financial communities will be represented on the panel.

The third annual computer chess championship will also be held in conjunction with ACM '72, which takes place at the Boston Sheraton Hotel.

The tournament will be a three-round "Swiss style" match, with one round held each evening, ACM noted. Play will begin Aug. 13, the evening before the conference. About 15 entries

are expected, ACM indicated, including the first team in the tournament to run its program using only a minicomputer.

ACM will also present several awards during the meeting, among them the Turing and Hopper awards for contributions to computer science and engineering. The latter award is given to an individual under 30.

Area Tours

Conference-sponsored tours will be conducted of area computer centers, including Multics at MIT's Project MAC, the Children's Museum Computer Center and Raytheon's hybrid facility.

A special silver-anniversary evening, Aug. 15, will feature a banquet and special recognition for founding members.

Registration fees are \$40 for members, \$65 for non-members, \$10 for student members, and \$18 for students who are not members.

Information is available from ACM headquarters, 1133 Avenue of the Americas, New York, 10036.

DP Case Studies Released by ASM

CLEVELAND — The proceedings of the silver anniversary conference of the Association for Systems Management (ASM) are now available from ASM headquarters here.

The edition, *Ideas for Management*, contains the papers and case histories presented at the annual meeting in Miami last May. The book has 22 articles in its 153 pages.

The hard cover book costs \$10 and is available from 24587 Bagley Road, 44138.

370 / 360

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Measurement 'Tools' Key To More Usable DP Power

DP productivity gains of "no less than 25% and perhaps as high as 100%" can be reached in most installations through the proper use of currently available measurement tools, according to Kenneth W. Kolence, an independent consultant.

He argues that much DP power, in the sense of ability to get work done, is either unused or misused. Hardware devices or specially designed software programs, or a combination of the two, however, can be very effective in pinpointing the problem areas.

User Alternatives

Users experienced with these tools tend to agree with Kolence. With objectively

"The available tools can identify the point, unique with each installation, at which optimization-degradation trade-offs must be considered."

gathered data, managers can scrap plans for apparently inevitable moves to larger, faster CPUs, and add new applications to previously saturated systems, or get currently operational workloads done sooner — or all three.

Vendors also seem to agree on their assessment of the situation for many installations that have not yet measured their operational effectiveness. It is not surprising, they say, to find users getting less than 30% utilization from a CPU, when a system is first studied.

These figures may be brought up to as much as 85% utilization, in some cases, the vendors note, but after a point CPU utilization can be increased only at the cost of an offsetting degradation to some other aspect of the system.

The available tools can identify the point, unique with each installation, at which optimization-degradation trade-offs must be considered.

Even allowing for vendor bias, it appears that the degree of improvement generally possible with the intelligent use of these tools should make them appeal to the DP manager who has recently become, perhaps for the first time in his professional career, consciously aware of the costs of his operation.

What 'Tools'?

What are these "tools" and why do we refer to them so awkwardly?

This is because they are in fact an awkward collection of things, all designed to attack the problem of DP inefficiency, but each doing the job in its own way.

The tools include "black boxes" wired, temporarily, to different parts of the systems they are monitoring for the presence or absence of electrical impulses. These monitors may include minicomputers and software for data reduction

and reporting of the test results, or these functions may be done on the subject system after the collection phase of the operation.

Some operating systems such as IBM's OS/360 and Univac's Exec 8 include modules that provide accounting for hardware system component usage, but these have been criticized as statistics too gross to be tied back to specific application programs in the event some element of the system is being overused.

Simpler operating systems such as IBM's DOS include the logic to create, but, curiously, not to capture job accounting records which provide a raw measure of which applications are utilizing which system elements over a period of time.

System Functions

Other software used on the machine

'Black Boxes'

Monitors Use Probes To Show Usage

"Black box" monitors are available from a number of vendors, under names ranging from amusing to very straight forward.

"X-ray" units, for example, are being marketed by Tesdata Systems Corp., formerly part of Clasco, and the Dynaprobe line is offered by Compress. Computer Synectics, on the other hand, simply calls its units System Utilization Monitors, (SUM).

Typical Monitor

Each monitor differs from the others but they all have some similarities, and a capsule view of the CPM X, recently released by Allied Computer Technology Inc., should illustrate the capabilities of a typical mini-based monitor.

The CPM X has 20 data accumulators in the basic version and a maximum of 48. These can be used in either count mode — when a counter is incremented each time an impulse is sensed by a probe, or in time mode, when the counter clocks the duration of the impulse.

Choice of data accumulation mode, as well as counter control and resetting, is operator selectable via plugboard wiring, a company spokesman noted.

Each counter may be read in a 7-decimal digit display, as either a whole number or a percentage of elapsed time. Display mode and time integration period are selected by the operator, the spokesman added.

As an option on one version of the CPM X, all counters, clock and record ID data are written to tape with a standard inter-record gap, for later reduction and anal-

What's It All About?

This Special Report reviews four general topics. Measurement tools, with which the user can determine what he is actually doing, with what facilities, are our first consideration. A review of features available in DOS/360 enhancement packages (Starting Page S/6) is followed by a look at the fast-maturing time-sharing services (Page S/13). Finally we take an overview of the small system user's situation.

under study senses the use of system functions, such as CPU time, I/O accesses and channel usage, internally without wire probes. Still other packages monitor and report which parts of each application program have been executed, and the amount of time they took during the processing run.

Packages and programming languages that allow a user to simulate one or more hardware configurations he plans to use are clearly part of the measurement tool collection. Job scheduling and job accounting packages are also considered by some, but not all users, to be part of the collection.

The tools are used to aid the effectiveness of a DP operation in three general areas:

- Improvement in the utilization of

currently installed equipment, to extend its useful life.

- Estimation of the effect of new applications on the ability to handle the current workload.

- Forecasting the results of getting new mainframes, or peripherals, or both.

Have users been able to make management decisions based on the use of these tools, used alone or in combination with one another? Definitely yes.

Last year, a team of analysts from Mobil Oil found it would lose throughput and its operation would be appreciably slowed if it went ahead with plans to install a "faster" IBM 370 in place of 360 gear already in place.

Amax Aluminum/Mill Products Inc. used a program analysis package to cut its

(Continued on Page S/4)

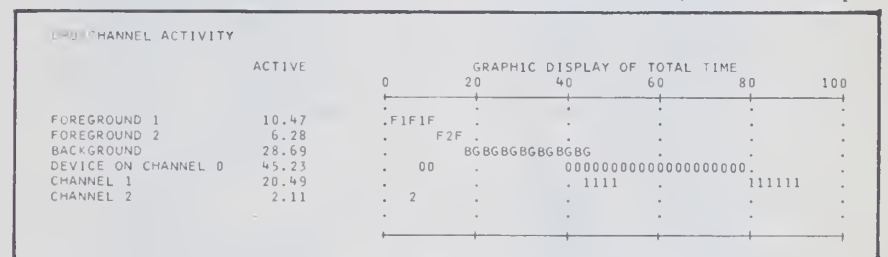
ysis.

The heart of the most sophisticated CPM is a Microdata 1600 mini, with software providing an interactive operator control language, a statistical data reduction system including Boolean operators, a graphic display package and a data extraction and display program.

Such hardware monitors are fine tools

A user of Tesdata's X-Ray was considering replacing a 360/65 including a 1M byte, 2.8 μ sec Ampex Extended Core Memory. X-Ray showed a timing conflict between the processor and the ECM.

By field-modifying the Ampex memory to a cycle speed of 1.8 μ sec and adding another ECM so that memory accesses could be interleaved, the user cut pro-



CUE report shows CPU and channel usage overlap.

for accumulating absolute records of what occurred, or failed to occur, at the machine points being monitored. They can often point immediately to overburdened system components. And, since they are external to the system under study, they add no processing overhead which might distort the readings.

Some Problems

But there are also problems. It takes training to know, physically, where the probes should be attached within the innards of the CPU. And it takes experience to know, logically, where they should be attached to get the most value from the monitoring run.

Detroit Edison used a hardware monitor but gave it up, according to Tim McDonough, because it couldn't get enough information in one run, with a limited number of probes. It couldn't recreate exactly the same conditions under multi-programming to run a second time to accumulate more data by placing the probes in different locations, he noted.

He was generally satisfied with the "impressive improvements" in the early stages of using the monitor, but was disappointed that the rate of improvement apparently could not be maintained through periodic remonitoring of the system. Since he could not justify its continuing use, the company gave up that method of measuring DP operations, he said.

Other users have had better experience.

cessing time 15% at "significantly less" expense than CPU replacement.

Another monitor user, with a less dramatic problem, cut the processing time of one of his most frequently used programs from 72 to 35 minutes by rearranging the core-image library to reduce disk seek time. The real problem of the poorly arranged library would not have been spotted without the monitor run, the user said.

Throughput Would Fall

A Mobil Oil study group eliminated consideration of a 370/155 as a replacement of a 360/75, based on the use of Computer Synectics' SUM, and much detailed thought. The group concluded the total system throughput would be reduced by approximately 11% if the 155 were installed; CPU time would also have to be increased sharply if the 75 were replaced, it said.

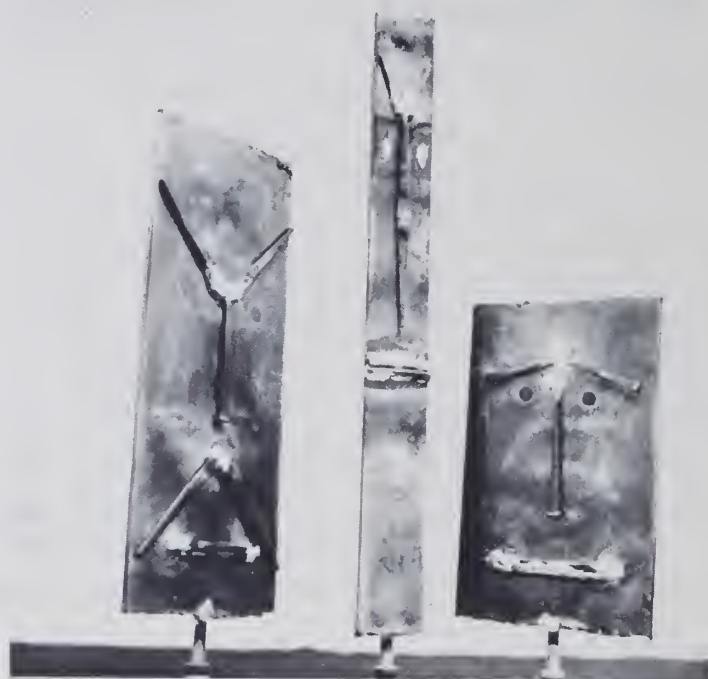
Even before the 155 study, SUM had enabled Mobil to find time holes in the apparently saturated 360/75 schedule, into which were fitted small jobs that otherwise might have had to wait all day.

Most of the monitors are small enough to be reasonably portable. Since they are not sold under any agreement that limits their use to a given CPU, as are many application software packages, for example, the monitors are quite generally transported from one CPU to another, even at other sites, in order to get maximum use.

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Users Can Play 'What If' Before Choosing Hardware

Rather than looking at real situations, simulators let the user play "what if," games and look into the future. Mathematical models of proposed hardware configurations are matched against proposed work loads to see how well they fit, before any new hardware has been installed or programs for new applications written.

Again, as with the other kinds of measurement tools, there are several simulation systems currently available. Case from Tesdata Systems, Scert from Compress and the System Analysis Machine (SAM) from Applied Data Research are examples. The SUM hardware monitor from Computer Synectics was enhanced with simulation capabilities in late 1970, so that users of that "black box" now have both types of measurement tools.

This type of cross-breeding is in fact a reflection of the way users have gotten the most benefit out of simulators in the past, and it is seen again with the release of Scert '70, earlier this year, which allowed data collected by Dynaprobe to be used with Scert.

An SMF/Case Input Processor is said to take the Systems Measurement Facility data from OS/360 output tapes and create Case input for immediate simulation. Therefore, this vendor is accomplishing much the same as Compress, but without a hardware monitor.

Models Too Rigid?

Some of the simulators have been faulted in the past for having such rigid mathematical models that users could not cope with such flexible software situations as multiprogramming, or the Burroughs' Master Control Program (MCP) which allocates system resources dynamically without any predefined par-

"Mathematical models of proposed hardware are matched against proposed workloads to see how well they fit before any new hardware is installed or programs written."

titions or reserved facilities.

SAM, on the other hand, includes its own language with which the user should be able to define nearly any situation, according to ADR.

Applied Management Systems Inc. (AMS) was one of the first users of SAM, and one of AMS' first uses of the simulator was in a study the company did for the State of Ohio in which it paired SAM with SUM to study both the present and the future.

Before AMS could put the IBM-based SAM to work, AMS' Norman Enger noted the firm had to adapt it to run under RCA's TDOS.

Resource Sharing Potential

Ohio had asked the company to determine the resource sharing potential at six data centers that used 10 programming languages and often had 75% personnel turnover annually. To get an answer, AMS generated models of the job stream and workload then in operation, the system software, files, media and control systems.

Even this essentially basic categorizing of what had to be done and how had its benefits, Enger said. A simple change in file access methods allowed the state's welfare job stream to run four to six times faster than before.

Ultimately each of the operations was optimized, the number of centers sharply reduced, and as a result the state expects to save \$4 million a year by 1974.

Virginia Study

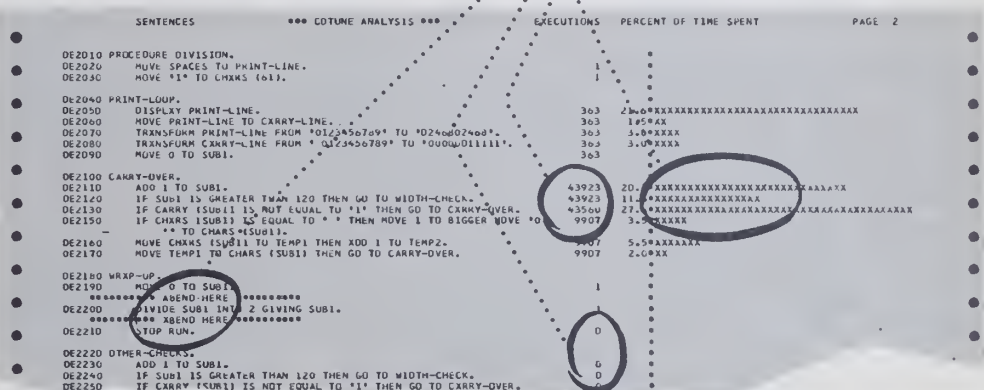
A generally similar study AMS did for the State of Virginia paired Case and SUM to simplify a workload spread over eight centers and 10 computer systems.

Case was owned by Virginia and AMS found it well designed to build up models of multiprogramming operations, Enger said.

The results of this study showed that all the DP work Virginia was then doing, could, and rightly should be handled at two centers. The only provision the consultants added to that recommendation, he noted, was that weekly and monthly jobs should not be processed on the same day.

Enger estimated the savings to Virginia from this degree of consolidation to be "about \$1.6 million/yr."

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Software Can Report System Use or Execution Times

There is no need for users to try to estimate how often a channel or a disk or even the CPU is in use, or how much execution time is spent in a particular part of a program. Nor are hardware monitors the only alternative to the educated guess.

Software packages, of two distinct types, can do the job for the concerned user. System monitors are concerned with measurement of system component utilization, without reference to application programs being processed. Program analyzers do the reverse, concentrating on the individual program without concern for system functions.

A typical system monitor is the Configuration Utilization Evaluator (CUE) software from Boole and Babbage. Available for use under either DOS or OS/360, CUE and similar packages measure the execution activity of all channels and devices and the CPU during a specified time period.

The performance data is recorded on

tape or disk and analyzed, giving a set of detailed subreports. These are used to aid in optimizing the system configuration for better throughput, by directing the user to suspected areas of contention.

A feature recently added to CUE's DOS version goes beyond measurement to provide management of a buffer area in core for frequently used logical and physical transient modules, thereby reducing the time previously needed to get them into core.

Rather than reporting on activity within all system components, the Direct Access Performance Software (Daps) from Allied Computer Technology zeroes in on disk activity only, with the idea that that particular area is the biggest problem for most users.

The Peripheral Monitor System (PMS) being marketed by GTE Information Services has its own niche in the measurement tool collection. This package senses the operating speeds of peripherals, compares the actual to rated speeds for the

devices and reports any exceptions.

The PMS approach is a good one, users told *Computerworld*, because IBM usually does not bother to time its peripherals as part of normal preventive maintenance. Yet variations, either high or low, from rated speeds can, and have, caused problems that went unresolved until PMS identified the errant unit.

Maintain Balance

A 1403 printer depends, one PMS user noted, on a very finely tuned coordination of horizontal print-chain speed and vertical carriage speed. If anything disturbs the balance, print results become unpredictable, the user said.

CUE has a reputation, apparently deserved, for being a good tool for the 360. Several users have reported being able to eliminate channels, or tape drives or disk units from their configurations, with little if any degradation, based on CUE reports.

In its present condition, however, it may be "too little and too late" for the

370, according to one user. He said the package is having problems in the initiate-terminate area, so that statistics reported are "suspect."

Further work apparently is required in the interface with the 3330 disk systems.

Nonetheless, the package "undoubtedly" will serve the 370 well once these problems have been resolved, he concluded.

While the foregoing tools have focused on loss of DP efficiency as a systems problem, other packages look at utilization from the programmer's perspective.

The Problem Program Evaluators (PPEs) and Lambda Efficiency Analysis Program (Leap), available from Boole & Babbage and Lambda Corp., respectively, are examples of this range of support.

Two well-received programs developed by the Stanford Linear Accelerator Center, Supermon and Prog Look, can be acquired through the Cosmic clearinghouse at the University of Georgia, but are useful only in an IBM OS/MVT environment.

Strobe, recently released by Programart, includes some niceties in its reporting on Cobol applications that the vendor considers unique. While the other packages report execution times in terms of core locations, Strobe converts these into Procedure Division paragraph names before printing its histograms.

Some Documentation Eliminated

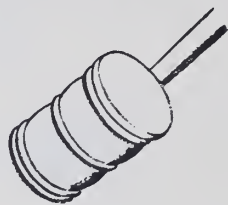
This obviously eliminates a great deal of cross-referencing to memory maps and other documentation during optimization effort, but it does require, according to Programart, the salvaging of the compiler output so that the paragraph names can be related to the actual addresses sensed during the monitoring operation.

All the packages sense and record the contents of the Program Status Word (PSW), on a periodic basis. Histograms

(Continued on Page S/5)

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DP Power is Unused Or Misused: Kolence

(Continued from Page S/1)

monthly use of a 360/30 from 600 to 380 hours, without sacrificing any productive operations. The company cancelled an order for a larger CPU that had seemed unavoidable before the measurement sessions, a spokesman said.

The State of Ohio was able to consolidate work which had been spread in six or more data centers, and gain better control over its operations while saving \$6 million/yr, through a study using several of the tools.

Warnings for Uninitiated

While these and other users are satisfied, even enthusiastic, about measurement's accomplishments, they also have warnings for the uninitiated.

The decisions that may result from a study of the data generated by these tools will have such an impact on the user's installation that all concerned better understand the capabilities and the limitations of each type of tool before it is used, the experienced users say.

Continuing use is the key to effective use of the tools, according to consultant Kolence.

Gilbert Curtis, president of Programart, which markets one of the newer program performance evaluators, put it more strongly. "Too often," he said, "the crash effort by an efficiency specialist does more harm than good. Measurement should be a standard tool for programmers — for the sake of education, professionalism and morale."

Curtis may be overstating the case, but even the skeptical user who has had some experience with measurement appears to accept the basic point: know what you are doing before you do it.

Software Shows Program Timing, Problem Areas

(Continued from Page S/4)

and supplementary reports summarizing the records are produced by a data reduction run after completion of the job stream being monitored.

PPE and Prog Look each give the user the option and responsibility of defining the frequency of the sampling of the PSW. Leap, on the other hand, sets its own sampling frequency dynamically, increasing the amount of sampling when the program is spending a great deal of time in one section of code, and reducing the sampling when there is no concentration of activity.

This means, according to Lambda, that the user automatically gets a sharper focus on the time-consuming parts of the program. Strobe, which can separate time spent by verb within paragraph, provides similar focus on possible problem areas, Programart sources noted.

Modify First

PPE was the tool used by Amax Aluminum/Mill Products to cut back the time spent on its 360/30 from 600 to 380/hr/mo. Hugh McDevitt, manager of computer systems, explains that all of the company's programs were analyzed and the reports on high activity areas were used as a guide to what should be modified first, if possible. The modified programs were run and rerun until they were as tight as Amax could make them.

One dramatic example of program performance improvement cited by McDevitt involved a year-end program which normally ran in five cycles at 14 hr/cycle. After PPE analysis and modification, the program ran in 19 min/cycle.

Until PPE helped Amax focus on it, a large in-core table was being searched completely for each transaction, even though a hit was made before the end of the table, McDevitt explained.

Changing of blocking factors, relocating data sets and cleaning up other program logic enabled the company to cut time on the machine 36%.



Don Leavitt

About the Author

This supplement was prepared by CW Software Editor Don Leavitt, who has been responsible for the Software/Services section of the newspaper since March 1970.

Leavitt entered data processing in 1962 as a programmer trainee for a major utility. Since then he has worked as a programmer and systems analyst in banking, manufacturing and service bureau environments.

He taught programming for three years and is currently on the DP advisory committee for the vocational high school being built to serve a seven-town region in central Massachusetts.

* MOST INTENSIVELY EXECUTED PROCEDURES *

MODULE NAME	SECTION NAME	LINE NUMBER	PROCEDURE NAME	STARTING LOCATION	PROCEDURE LENGTH	EXEC. TIME SOLO	PERCENT TOTAL	CUMULATIVE SOLO	PERCENTAGES TOTAL
USERPROG	SAMPLEU	81	WAY1-A	0009E4	106	19.93	31.25	19.93	31.25
USERPROG	SAMPLEU	89	WAY2-A	000A62	82	17.76	24.86	37.69	56.11
USERPROG	SAMPLEU		GENERATEO-COOING	000B3E	94	9.69	14.88	47.39	70.99
USERPROG	SAMPLEU	96	WAY3-ABS-SUB	000ABA	96	9.72	11.63	56.61	82.63
USERPROG	SAMPLEU					1.91	4.76	58.52	87.39
USERPROG	SAMPLEU	103	WAY4-STRAIGHT	00081A	36	3.01	3.95	61.54	91.35
USERPROG	SAMPLEU	59	MAIN-LINE	000730	200	2.70	3.22	63.74	94.57
USERPROG	SAMPLEU					1.12	1.25	64.86	95.83
USERPROG	SAMPLEU					.96	1.07	65.83	96.90
USERPROG	SAMPLEU	87	WAY2-INDEXED	000A54	14	.83	1.04	66.67	97.95

* MOST EXTENSIVE INACTIVE MEMORY AREAS *

MODULE NAME	SECTION NAME	FROM LINE	WITHIN PROCEDURE	THRU LINE	WITHIN PROCEDURE	FROM LOCATION	THRU LOCATION	AREA LENGTH	CUMULATIVE LENGTH
USERPROG	ILROOSPO					000000	0006F7	1784	1784
USERPROG	SAMPLEU	56	SOME-INITIAL-STUFF	58	SOME-INITIAL-STUFF	000628	00072F	264	2048
USERPROG	SAMPLEU		INIT2 AND INIT3 CODE		INIT2 AND INIT3 CODE	000B9C	000C39	158	2206
USERPROG	SAMPLEU		INIT1 CODE		INIT1 CODE	000900	00007F	128	2334
USERPROG	SAMPLEU	75	MAIN-4	76	MAIN-4	00399C	0009D7	60	2394
USERPROG	ILROSTPO					000000	000034	53	2447
USERPROG	SAMPLEU	69	MAIN-3	69	MAIN-3	00081C	000839	30	2477
USERPROG	SAMPLEU	72	MAIN-3	72	MAIN-3	0008AA	0008AF	6	2483
USERPROG	SAMPLEU	64	MAIN-3	64	MAIN-3	0007F8	0007FD	6	2489

By showing both the most active and the least active parts of a program, this Strobe report identifies those procedures on which improvements might pay off best, and areas which the programmer might consider for overlays in case of core limitations.

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Stabilization a Good Thing

Independent DOS Add-Ons Seen Reason to Hold 360s

Originally, IBM's "functional stabilization" of DOS for the 360 user, announced last winter with DOS Release 26, was viewed by many with deep concern over "lack of support" for their basic software. But second thoughts now suggest that the stabilization is one of the best things that ever happened to the user.

Support for the operating system will still be available from IBM if needed, even though the company may charge for its services after March 1973. But in any case, the user knows now that he, and not the hardware vendor, controls how the operating system will change.

A user can add features to DOS through his own coding efforts. More likely, he will be able to utilize one or more of the independently marketed enhancement packages available, knowing that IBM isn't going to change DOS logic in a way that would prevent the continued use of

the packaged features.

According to some industry observers, the expertise shown by many of the independent DOS-enhancement packages convinced IBM (if it needed convincing) that it could stop its own development work for the 360 user, in order to concentrate on the 370.

Beyond that, however, the availability of these independent packages has convinced many 360 users there is no great need to move up to the 370, or even "across" to OS/360.

Going one step further, this theory notes that the users' interest in staying with DOS on the 360, and IBM's decision to leave the system logic alone, will continue to encourage the independent software houses, and the users, to develop even more enhancements to meet 360 needs.

If that theory holds up, the user who will benefit most is the one who takes

time to find out what the operating system and each of the available enhancements can do for him, the user who determines what changes he wants and who then applies them to his operation.

Even the user who decides against using any enhancements will reap some benefits from the current situation. He won't have to adjust his DP operations to accommodate new releases of DOS from IBM.

In the past, such accommodations have sometimes involved recompilation of entire program libraries, or rewriting of JCL job streams, without any appreciable improvement in the operation as a result of the extra effort.

The independent packages have become more complex as user interests have become better known. The first "add-ons" met one specific need and did nothing else. Now there are elaborate systems such as Extended DOS from The Computer Company that provide, at the user's

option, a broad spectrum of enhancements — all in one package.

Most currently available packages fall somewhere between those extremes. They combine two, three or more of the extra features that users apparently want most. They are bringing to the DOS/360 user, on a selected basis, capabilities long available under OS/360.

DOS Coding Changes

Some of the packages require actual changes in DOS coding, while others are literally add-ons that complement rather than alter existing logic. Problems with the type that alter DOS might put users into maintenance situations similar to those that can occur when there are hardware problems in a multi-vendor installation.

But, as in that case, it appears that the software engineers from IBM and the independents will work together to solve the problem and only then try to determine who, if anyone, should pay for their efforts.

The fact that the packages themselves had price tags caused some concern at first among users who were accustomed to IBM's "free" system software.

But now most recognize that the faster processing, better core utilization and simpler operating procedures made possible with the packages often save enough in other costs to quickly offset the dollars-and-cents cost of the package.

Packages have been known, in some cases, to eliminate the need for an apparently inevitable hardware upgrade. That could certainly go a long way toward justifying the cost of the packages involved!

Spoolers Prominent

Any categorization of the enhancements is bound to leave some uncovered, but clearly spoolers of I/O for slow speed card punches and printers are one prominent class.

Typically, these packages transfer records at high speed to some unused section of core or on disk, from which they can later be moved to the slow device as it becomes available. The original application program can thus do its work without being tied to the slow pace of the I/O gear.

Program relocatability is another feature in several packages. DOS normally requires a separate image of a program to be cataloged for each partition in which the program may be run. By adding slightly to the core used in each module, however, the "relocatability" packages allow a user to access a single cataloged image of a program to any available partition.

The degree of core savings allowed by the elimination of the essentially duplicate core image libraries for each partition would obviously be dependent on how many partitions and how many application programs are used.

While relocatability cuts storage requirements, packages that support a blocked FETCH of program modules from the library reduce the time needed to get to work on the programs themselves.

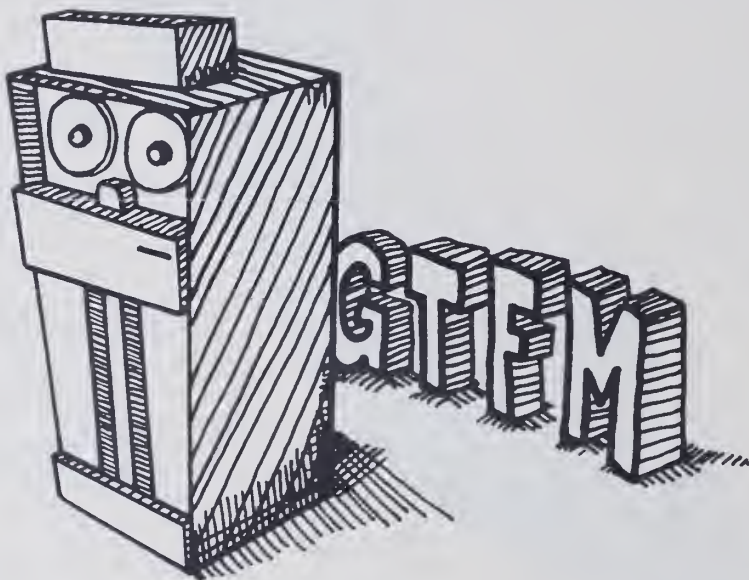
IBM provided for single module FETCHES; the packages bring in multiple modules, the number differing with the technique used and the size of the modules. To use the blocked FETCH effectively, users may have to reorganize their libraries so that logically related modules are physically contiguous.

Software to determine which DOS transients are used most heavily and, once these are identified, to manage them as core-resident routines, have begun to appear from various vendors, either as stand-alone packages or as features added to an existing enhancement package.

Elimination of the I/O processing pre-

(Continued on Page S/8)

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Simulation Backer Says

Benchmarks Not Best Way to Choose Hardware

Users considering a change of hardware often have difficulty trying to determine which vendor, if any, is really telling the truth about the system being proposed. Almost in spite of the vendors, the user has to find a way to objectively evaluate the proposals.

Benchmarking sounds like a good approach, but it requires the user to make too many assumptions that may not hold up in day-to-day operation, according to Fred Ihrer, president of Compress Inc. Instead, he advocated the use of simulation as a selection tool.

Any good evaluation, Ihrer went on, must enable the user to determine whether the hardware/software configuration will process existing and planned workloads within prescribed time constraints, and for the lowest possible cost.

Each part of this definition is important to the user, Ihrer noted. It does no good to consider a system that cannot perform

the DP operations the user needs. And it would be foolish to accept a system that could only handle the current DP load without any potential for new applications.

Central to almost every user's ideas of proper selection is "time."

The only problem, Ihrer added, is that few users, or vendors, can agree on what kind of "time" is important. He pointed out that in DP operations, users can, and probably should be concerned with turn-around time, clock time, response time and elapsed time. The significance of each depends on the original purpose for acquiring the hardware, he said.

Benchmarks Can Help

Benchmarks, he continued, can presumably show that the proposed hardware and software really do exist. But there is no way to extrapolate real system workload time from benchmark times

with any assurance of accuracy. For timing purposes, benchmarks are no better than drawing straws, according to Ihrer.

Suppose, he said, a user has a workload which takes 15 hours on his current equipment. He defines one of his five current jobs as a benchmark "to be sure the new system will really work" with his actual problem.

What does it mean, he then asked, if the benchmark is done twice as fast on the new system? Will the system handle the entire workload in seven-and-one-half hours? If the benchmark runs twice as long as the "same" program on current gear, will the full workload take 30 hours? If the benchmark matches the live program, will there be no time gain by moving to the new equipment?

Another problem with benchmarks, he said, is the question of who should conduct them: the vendor or the potential

user? If the vendor does the work, does he assign expert programmers for the best possible results, or does he use those persons not busy elsewhere, to control costs on a proposal that may never be accepted anyway.

If the user does his own benchmarking he must train his staff to work effectively with a hardware system on which, if the proposal is rejected, it may never work again.

Simulation Better

Ihrer argued instead that simulation techniques can be used to accurately predict all kinds of time considerations. In addition, modeling helps to predict system capacity used and unused, and aids in defining the optimal system design and hardware configuration.

Hardware vendors generally do not like simulation as a selection tool, according to Ihrer.

He scoffed at a report from the Business Equipment Manufacturers Association (Bema) in which the group claimed to have studied the situation in depth.

"Simulation is neither sufficiently precise nor consistent to be used as the basis for evaluation and selection of ADP equipment in competitive procurements," Ihrer quoted Bema as saying in August 1971.

Bema never asked his company, he said, for information about simulation results, although the association said it had "no reports of how equipment selected by simulation performed compared to what was expected through simulation."

In fact, Compress and any other vendor of simulation software will provide a variety of case studies for anyone wishing the information, Ihrer said. And the documented case studies show the simulated results were very close to the actual once the equipment was installed, he added.

An Alternative To Spending More Money For Computing And Data Processing

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While configuration analysis is valuable and should be included in any measurement program, greater payoff can often be achieved by monitoring data base activity, problem programs and the operating system itself.

A good monitoring session will reveal sufficient data to direct optimum data file reorganization. And, by pinpointing the high activity areas in frequently-run production programs, really significant reductions in execution time can be made by optimizing this code. The monitoring of operating system activity can lead to a significant reduction in overhead. Therefore, don't take for granted that any particular part of your system is or is not efficient. Your criteria for selection of a measurement device should be based on how comprehensive the system is—plus how knowledgeable supporting vendor analysts are in training you to interpret the measurement data the system generates.

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A final word of caution

Now that we have given you some comments on computer performance evaluation and optimization you should know that in some cases there are alternatives to Tesdata's products.

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'Indy' DOS Support Reaffirms 360 Use

(Continued from Page S/6)

viously needed to make these transients available has cut application program execution time appreciably, according to users.

Job accounting packages illustrate how independents often finish work IBM starts. DOS Release 25 included the logic to create but not to capture records which would document what jobs were in fact done on the computer, what system resources were used and for how long. Several independents have made available capture and reporting routines needed to let the user know what the original DOS logic had found.

Partition load balancing, in which software makes partition assignments based on the operating characteristics of the application programs, is also available to DOS users from the independent software houses.

And obviously, the support for six DOS partitions, rather than a maximum of three under IBM's DOS, puts that feature of The Computer Company's Extended DOS literally in a class by itself.



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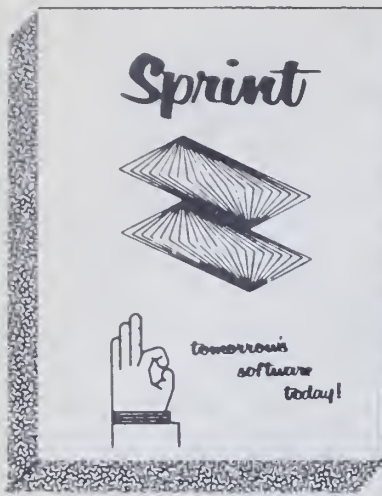
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Cobol Should Be Improved At Source, Object Levels

The average Cobol program may be easy to write, except for its verbosity, but it is not particularly effective in execution time or core utilization. There are, however, ways to improve the situation, according to Gordon Link of Tesdata Systems Corp.

At a meeting of the government-wide Computer Performance Evaluation Users Group Link said that Cobol-oriented installations should reevaluate their programming techniques and the compiler-generated code.

In other words, he noted, the user who really wants to optimize his work must attack the problem from both the source and object code levels.

He detailed what programmers could, and should do to clean up their code, but failed to tell the users his company's Stage II program can aid in the improvement of source code — and the Optimizer package from Capex Corp. analyzes object code and does something about it.

Redesign Whole Thing

The programmer or systems analyst could consider optimizing an operational application by redesigning the entire thing, Link said, but this approach could disrupt the end-user department.

It would be better to make changes that are essentially "transparent" to the end-user, he said, adding these might include file organization or access, method changes, resequencing the functions as handled within a program or replacing inefficient statements with equivalent, but more effective coding.

Functional optimization might be as simple as reordering a series of tests, for transaction codes — for example, so that the most common situations are handled first, he noted.

Exercise Program

Users should, in any case, put the program as originally written into production and exercise it thoroughly before attempting any optimization. In this way both original and supposedly optimized documentation will be available for comparison, Link said.

Some optimization can, however, be handled as part of initial coding. ON SIZE ERROR is extremely inefficient; ROUNDED is inefficient; and IF ALPHA and IF NUMERIC are "expensive" — all are coding techniques

to be avoided if possible, he explained.

In addition, some optimization isn't worth the extra work it can bring. An altered PERFORM may be efficient, Link noted, but it is "tough to debug."

Binary Search

Even faster, but more core-consuming techniques include a binary search, which would do the same job in 6.4 msec, and a "partition scan," which would take only 1.25 msec. This last approach, Link explained, first involves the use of a sample table, which would then point to the particular segment or partition of the full table in which the search argument might be found.

He also stressed that programmers must use data formats appropriate to the work to be done on the field in question. Computational and Computational-1 or Computational-3 notations shouldn't be mixed in arithmetic operations, he added.

Although Cobol will align decimal points and handle various other housekeeping chores, Link urged programmers to avoid burdening the object program with more work than necessary. He reminded his listeners that arithmetic problems could crop up "almost anywhere." The IF statement, he noted, is an implied arithmetic operation.

Products Can Help

Tesdata's Stage II package, and its optimal service based on the package, is an automated implementation of source optimization methods. It analyzes a Cobol program, produces a diagnostic listing and, after procedural optimization, generates hard-copy corrective cards.

A Navy installation reported it reduced execution time 16% and core requirements 3K to 4K byte/program, for programs processed by Stage II.

Programmers should make sure their normal approaches to problems are as good as they can be. To illustrate, he said table look-ups are very common, but their structuring has a decided effect on execution time or core requirements.

An iterative, subscripted loop is very efficient in terms of core, he said, but is the slowest of the several possible techniques. A straight line search, in which a search through a table is controlled by numeric literals rather than subscripted values, cuts

(Continued on Page S11)

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RUN DATE - 06/08/72		TESDATA SYSTEMS CORPORATION		PAGE - 11	
TIME = 23.11.41		STAGE II COROL OPTIMIZER OUTPUT LISTING			
AUTH-NAME = UNKNOWN		VERSION 03 REVISION 000 DATED 05/15/72		PROG-NAME = MITRE	
LINE# SEQNR *** EFFICIENCY LOG ***					
00492	027800	MOVE H-QTY (TYP-CTR) TO T-QTY4 (TAR)	SUB IS COMP3	DATA PATTERN	SUBSCR CALC
00493	027820	ADD 1 TO T9L-CTR	UNSGNED RECV		
00494	027840	ADD 1 TO TYP-CTR	SUB IS COMP3	SUBSCR CALC	
00495	027860	GO TO TYPE-RTNE.	C3 RECV LNCH	UNSGNED RECV	
00496	027880	GO TO TYRF-RTNE.	SUBSCR LOOP	C3 RECV LNCH	UNSGNED RECV
00497	028000	DEPT-TOTALS.	SUBSCR LOOP		
00498	028020	MOVE *SCRAP COST OF ABOVE * TO DESC1.	1	REFERENCES	
00499	028040	MOVE SUR-CTR TO DESC2.	*DISR OPERND	MIX USE D/C3	UNSGNED RECV
00500	028060	MOVE * ITEMS* TO DESC3.			
00501	028080	MOVE 1 TO TAR.	C3 RECV LNCH	UNSGNED RECV	
00502	028200	ADD-COST.	1	REFERENCES	
00503	028220	ADD T-COST (TAR) TO SURT-COST.	SUB IS COMP3	SUBSCR CALC	
00504	028240	ADD 1 TO TAR.	C3 RECV LNCH	UNSGNED RECV	
00505	028260	IF TAR < 11 GO TO ADD-COST.	SUBSCR LOOP		
00506	028280	COMPUTE PERCENT ROUNDED = (SURT-COST / TOTAL-COST) * 100.	MULTIPLY USE	ROUNDED	DEC UNALIGN
00507	028300	SUBTRACT 1 FROM ITEM-CTR.	UNSGNED RECV		
00508	028320	COMPUTE SURT-COST ROUNDED = SURT-COST / 100.	DIVIDE USE	ROUNDED	
00509	028340	MOVE SURT-COST TO L-COST.	DEC UNALIGN	UNSGNED RECV	
00510	028360	MOVE * OP * TO FILL1.			
00511	028380	MOVE PERCENT TO L-PERCENT.	UNSGNED RECV		
00512	028400	MOVE * % OF TOTAL COST* TO RF-BRKDN.	DATA UNALIGN		
00513	028420	MOVE *R* TO CC.			
00514	028440	PERFORM WRITE-IT.			
00515	028460	MOVE * COST OF REMAINING * TO DESC1.			
00516	028480	IF SUR-CTR < 11 MOVE ZEROS TO ITEM-CTR ELSE	*DISP OPERND	MIX USE C3/D	
00517	028500	COMPUTE ITEM-CTR = ITEM-CTR - SUR-CTR.	UNSGNED RECV		
00518	028520	MOVE ITEM-CTR TO DESC2.			
00519	028540	MOVE * ITEMS* TO DESC3.			
00520	028560	COMPUTE TOTAL-COST ROUNDED = TOTAL-COST / 100.	DIVIDE USE	ROUNDED	
00521	028580	COMPUTE BALANCE ROUNDED = TOTAL-COST - SURT-COST.	ROUNDED		
00522	028600	MOVE BALANCE TO L-COST.	DEC UNALIGN	UNSGNED RECV	
00523	028620	PERFORM WRITE-IT.			
00524	028640	MOVE * TOTAL FOY/FAC COST * TO DESC1.			
00525	028660	MOVE TOTAL-COST TO L-COST.	DEC UNALIGN	UNSGNED RECV	
00526	028680	PERFORM WRITE-IT.			
00527	028700	MOVE ZEROS TO SUR-CTR.			
00528	028720	MOVE ZEROS TO SURT-COST, TOTAL-COST.			
00529	028740	IF END-SWT = 'YES' GO TO END-RUN.			
00530	028760	PERFORM PRINT-MENS.			

Stage II optimizer gives detailed comments, in abbreviated but still understandable English, at the right of the user's Cobol program statements to which they apply. This sample is probably "loaded" to show more diagnostics than the average.

Users Should Optimize Cobol Source, Object Coding

(Continued from Page S/10)
lookup time from 187 msec to 36 msec, for a 1,000 item search, Link added.

Capex Corp.'s Optimizer package apparently improves run times and core use in the same way as Stage II processing, but for a different reason. The Capex package analyzes object code and strips away all com-

piled-generated logic not pertinent to the problem as coded.

Every procedural paragraph, for example, ends in object code, with a dummy branch instruction so that an exit address may be inserted during execution, if a PERFORM sequence ends with that paragraph. Optimizer reviews the entire object program, determines which of

these branches are actually used and eliminates the rest.

Object code, as originally generated, is resequenced, replaced with more effective instructions and otherwise massaged by Optimizer to do a more efficient job.

The core saved may be used for additional I/O buffers, created by the Capex package without any change in the user's source

code, or it may simply be made available for another partition that would not have been possible before optimization.

Both Tesdata and Capex note, incidentally, there is no incompatibility in their approaches and users could easily run programs through both optimizers to gain a "double dose" of improvement.

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REPORT OF SVC USAGE													
*** BY SVC NUMBER ***													
SVC	TIMES USED	FUNCTION	TYPE	SVC	TIMES USED	FUNCTION	TYPE						
SVC000	508648	EXCP	1	SVC000	508648	EXCP	1						
SVC001	273301	WAIT	1	SVC001	273301	WAIT	1						
SVC002	263314	PSI1	1	SVC010	269987	GETMAIN/FREEMAIN	1						
SVC003	98403	EXIT	2	SVC003	98403	EXIT	2						
SVC004	39883	GETMAIN	1	SVC004	39883	GETMAIN	1						
SVC005	21	FREEFMAIN	1	SVC047	26916	STIMEP	2						
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REPORT OF MODULE USAGE													
MODULE NAME	USE COUNT	PERCENT OF USE	CUMULATIVE USE PERCENT	MFT SIZE	MVT SIZE	MODULE FUNCTION							
IGG0193L	514	2.29	2.29	1024	1024	OPEN MERGE AND ACCESS METHOD DETERMINATION	SVC019 SVCLIR						
IGG0190W	514	2.29	4.58	1024	1024	OPEN MERGE AND DCA EXIT	SVC019 SVCLIR						
IGG0190W	514	2.29	6.87	1024	1024	OPEN MERGE	SVC019 SVCLIR						
IGG0190W	514	2.29	9.16	1024	1024	OPEN FINAL MODULE	SVC019 SVCLIR						
IGG0190S	513	2.28	11.44	1024	1024	OPEN FINAL LOAD REWRITE JFCB	SVC019 SVCLIR						
IGG02002	407	2.21	13.65	1024	1024	CLOSE WHERE-TO-GO LOGIC	SVC020 SVCLIR						
IGG02002	407	2.21	15.86	1024	1024	CLOSE XCTL TO APPROPRIATE MODULE	SVC020 SVCLIR						
IGG02006	403	2.19	18.03	1024	1024	CLOSE XCTL TO APPROPRIATE MODULE	SVC020 SVCLIR						
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REPORT OF DEVICE UTILIZATION													
UNIT ADDRESS	EXCP COUNT	% CPU BUSY	% DEV BUSY	% DA SEEK	% DATA TRANS	% NOT READY	DEVICE CLASS						
130		0	0	0	0	0	DIRECT ACCESS						
131	46239	4	17.5	0.2	17.0	0.0	DIRECT ACCESS						
132	7372	0	0	0	0	0	DIRECT ACCESS						
133	16	0	0	0	0	0	DIRECT ACCESS						
134	27	0	0	0	0	0	DIRECT ACCESS						
135	45	0	0	0	0	0	DIRECT ACCESS						
136	19	0	0	0	0	0	DIRECT ACCESS						
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DATA SET NAME													
SYS1.LINKLIR	236	MT111	14713	42 0	17 19	7.78	17.61						
SYS1.SVCLIR	236	MT111	20940	84 0	97 19	14.56	32.93						
SYS1.SYSJOB0E	236	MT111	20554	139 0	144 19	31.88	31.40						
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REPORT OF CHANNEL UTILIZATION													
CHANNEL NUMBER	NUMBER OF CHANNEL REQ	NUMBER OF TIMES BUSY	PERCENT OF TIME BUSY										
0	23767	12	.0										
1	153631	52895	34.4										
2	205898	64908	31.5										

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JCL Problems Fade With Familiarity

One of the biggest bugaboos for programmers and operations managers a few years ago has almost disappeared. The preparation and modification of Job Control Language (JCL) "just isn't a big deal anymore," according to most users.

JCL was a totally new requirement, in addition to many other requirements, when IBM's DOS and OS/360, RCA's TDOS and other operating systems that use JCL appeared in the late 1960s. The passage of time and familiarity of working with the JCL requirements have done much to eliminate original complaints.

Also, many application packages and systems and utility software programs from independents now come complete with most of the JCL needed to tie them into the user's system.

Cobol source code generators tend to generate the appropriate JCL cards as well as the logic of the application program they are meant to create.

DOS users don't even have to face the once-nagging problems of keeping track of the JCL card decks, of updating individual entries by repunching individual cards and of creating new job streams by inserting, deleting and resequencing cards.

ECM Users Aided

Most 'enhancement' packages on the market today are designed for the DOS/360 user, but one — the ECM Management Program (ECM/MP) from Ampex Corp. — is intended just for OS/360 users with core extensions.

Designed originally for use with Ampex ECM, the program may improve throughput 10% to 15% with any of the "foreign" core boxes, including those from Fabritek and Data Products. The slower speeds of the IBM 2361 Large Core Storage means, however, that systems based on that unit will not enjoy the same throughput gain, Ampex said.

Packages are available with which job streams are cataloged, and then maintained and used from a disk-based Procedure Library, much like the one that is a regular feature of OS/360.

JCL may have gotten its bad reputation from two separate situations that tended to hit users after they had finally gotten used to ASSGN, DLBL, EXTENTS and all other JCL parameters.

Extensive Revisions

A change in DOS release 16, or thereabouts, required rather extensive revisions in the JCL cards that had worked successfully up to that point. Otherwise, users who shifted from a DOS to an OS/360 environment had to make JCL changes as well as extensive changes within the application programs.

The change to OS-style JCL was itself quite easy, users who have been through the operation admit, but this was overlooked by others frustrated by programming problems. In other words, JCL became something of a whipping boy in this situation.

The rewrite of JCL required to move programs from one DOS release to another, when IBM changed the "ground rules" several releases ago, wasn't bad either, according to Hal Farrington of Baystate Computer Center, as long as the user didn't try to do the work for all programs in a single massive conversion.

If programs were changed over to the new DOS release on a one-at-a-time basis, perhaps as they needed to be recompiled, the conversion was no problem at all, Farrington added.

Statement Complexity

Users of RCA (now Series 70) TDOS used to complain bitterly about the complexity of JCL statements needed under that operating system. They were commonly a mixture of pre-defined parameters that were applicable from processing cycle to

processing cycle — and could therefore be punched on cards — and factors that varied and had to be entered through the console keyboard.

This is no longer the case, users said at the recent Series 70 Computer User's Association meeting — JCL for TDOS is simple to use, with a good bit of flexibility.

The extent to which DOS/360 users have become familiar with JCL is perhaps best illustrated by the multiple file definition technique used by Brogness Hospital, Kalamazoo, Mich., to get more use out of its RPG and

Cobol programming [CW, June 21].

The hospital "fools DOS" into thinking there are two or more files, when there is only one in fact, by entering separate sets of JCL cards for each "file."

The only difference in the sets, according to senior programmer David R. Thompson, is the file name.

Extents and the other parameters that define the physical location and condition of the data set obviously must be the same in all the JCL sets that really refer to the same physical file, Thompson added.

Series 70 Accepts IBM DOS Using 'Reprieve' Package

While 360 users operating under DOS have been assessing the significance of the "functional stabilization" of their system software by IBM, and the possibilities for enhancing it themselves through the many independent software packages, Spectra users have faced a totally different situation, but one that could possibly wind up at the same point.

The systems software distributed by RCA before it threw in the towel as a hardware maker, was generally considered poor although perhaps improving near the end.

Since Univac took over the RCA user base and renamed the Spectra and RCA series "Series 70," major revisions of all three remaining operating systems (DOS, TDOS and VMOS) have been released. These releases indicate that Univac management is concerned about the Series 70 user needs and is able to do something about them.

In the light of the already updated operating system updates and the promise of another round of releases to be completed by January, users might

decide to stick with their hardware and with Univac-provided software.

On the other hand, in late winter an independent software house announced a product that could add a new dimension to the Series 70 users' software, at least. National Information Systems released "Reprieve" which is said to allow IBM's DOS, and presumably all the independent enhancements related to that system, to operate on Series 70 equipment.

At the time of the NIS announcement, IBM spokesmen indicated that DOS might be made available to Series 70 users, although there would be an installation fee and maintenance procedures would have to be worked out.

With "Reprieve," the users would apparently gain access to one further range of software in addition to DOS and its enhancement. Many utility and application packages are written for DOS/360 with a note that they could be adapted to the Series 70. In a "Reprieve" environment, it would seem no such adaptation is required.

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T/S Vendors Supporting Users' Communication Needs

"Whatever the design approach, the new Remote-Computing Networks (RCNs) are providing needed data communications services to users who can afford their own computers, but not their own networks, according to a special report recently published by Time-Sharing Information Services Inc. (TSIS)

"In fact," the report continues, "the RCNs are becoming the computer utility which so many people thought time-sharing was going to be."

The new networks are a complete reversal of the original "utility" concept proposed in the late 1960s, in which the vendors thought the important factor was the sharing of the costs of "raw computer power," and, in effect, it was up to the user to get his data to the centralized CPU any way he could, TSIS notes.

Pattern Forming

As a class, the RCNs emerged early in early 1971 and although they are still early in their development, a pattern is already obvious, according to the report. By combining reliable data communications and computing, the vendors are providing new levels of service for the most vital information needs of multi-location companies.

The RCNs supported by General Electric and Tymshare have been "consciously planned network services." Others were developed by vendors who had been providing remote-batch, conversational time-sharing or dedicated services, and began building networks to minimize their costs and to maximize their services.

As a result of these diverse origins, TSIS says, the services that developed are "creative and various," and "since remote-computing companies cannot deliver or charge for their services if their phone lines are down, they are — as a class — highly motivated to improve their communications networks.

Two Classes

Approximately two dozen companies now offer some form of national network service, and these fall into two general classes. Most use a "star" configuration, with lines from all users feeding into a single computer complex, often through a series of multiplexers and data concentrators. Both GE and Service Bureau Corp. (SBC) use this technique and, by coincidence, the computing centers for both are in Cleveland, Ohio.

Others, most notably Tymshare's Tymnet service, are configured more like a ring, supporting several CPUs in several locations with two or more network paths uniting them.

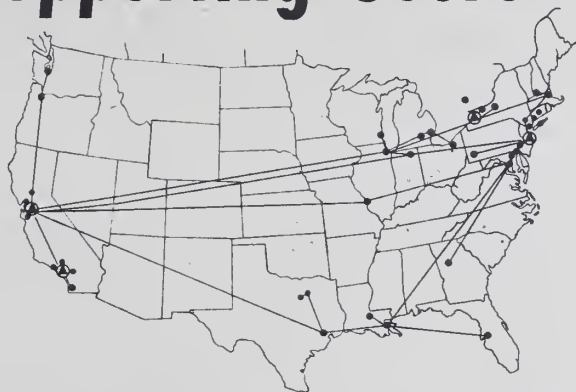
"Two or more paths" has become the driving concern behind all the nets. This build-up of redundancy is comparatively simple on land routes, but GE has recently completed an operation that dramatizes all vendors' concern for this backup support.

Trans-Atlantic Cable

Already providing data communications between Cleveland and Europe by satellite transmission, GE laid a trans-Atlantic cable in February to provide another route "just in case." The cable is now being tested and will be in service as soon as it has been checked out.

Tymshare has developed and installed 22 specially-designed minis to insure good communications all along the 40,000 miles of leased telephone lines that make up its "ring" network. But the company didn't consider its RCN complete till it was able to add the master software control system to locate and use alternate circuits in case of line saturation or failure between any two points in the ring.

Shifting from one line to another in order to get the data a particular user wants to and from the CPU is important to both the user and the vendor. It relieves the user of concern for line problems; and it automatically helps to balance the system load so the vendor can



Tymshare's "ring" configuration provides, to authorized users, access to multiple CPUs, any of which could be the user's primary processor.

handle more users at the same time.

Network Customer

The one-time problem solver doesn't need RCN capabilities, he just needs access to a computer. The network customer, according to TSIS, is the one who needs a computer/communications sys-

tem which permits users scattered through a large geographic area to access a common CPU, thus enabling these users to share programs and data files.

In cost and complexity, a user building a complete data network is "a little like building and maintaining you own highway," TSIS notes, adding that it is a



(Maps from Time-Sharing Information Service Inc.)

Service Bureau Corp's "star" configuration is typical of the networks based on a single centralized computing facility.

problem of such magnitude that only the largest users can afford to solve it on their own.

The RCNs not only take over the communications problems, but also:

- Permit access to data bases, either private or public

(Continued on Page S/14)

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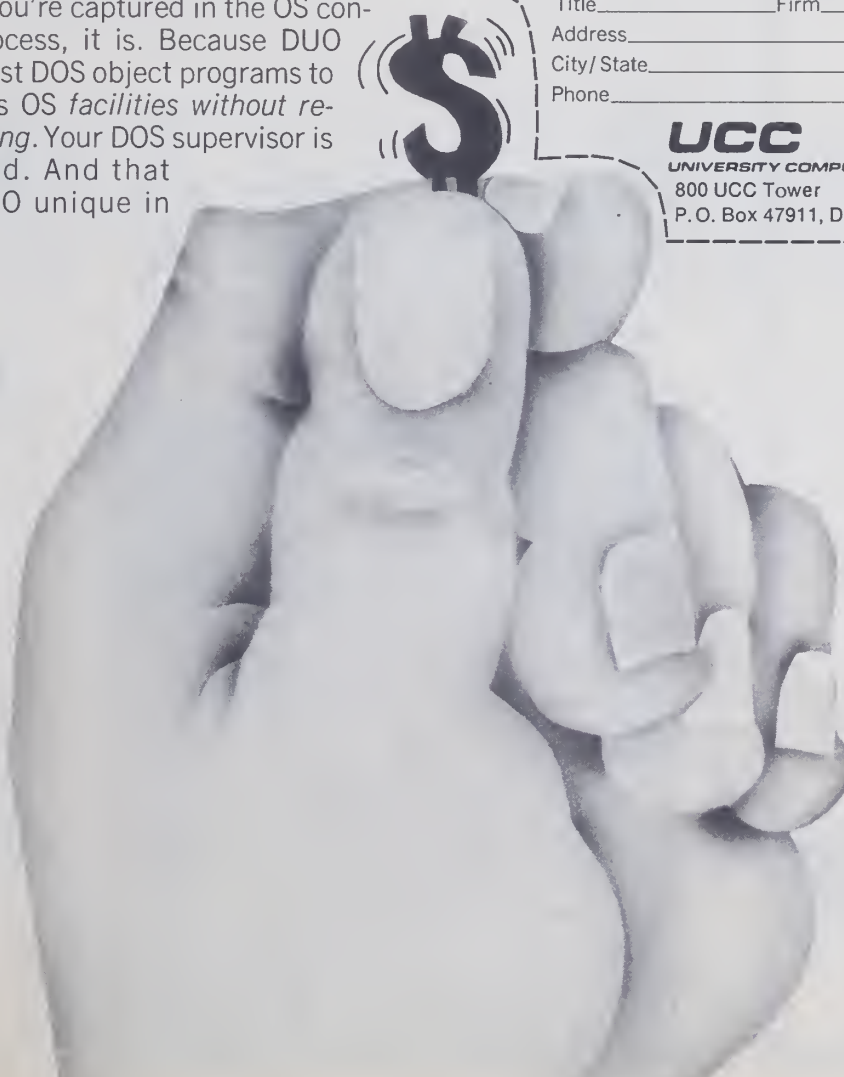
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GE Network Service Aids Booth On-Line Order Entry

For the past six months Booth Fisheries, Chicago, has been using an on-line order entry and inventory control system, based on GE's Network Service with a computer complex in Cleveland, Ohio. There were problems and "it was nip-and-tuck for a while, but it looks like we're going to make it," Robert Kunio, system engineer, said recently.

The system stretches from the company's corporate offices to its plants in Texas and New Hampshire. The fragile nature of the frozen seafood the company sells, and the high costs of warehousing it combined to make on-line control the only reasonable choice, he added.

Four Hazeltine 2000 CRTs (three active, one spare) and a Teletype terminal at company headquarters are linked with a Hazeltine 2000 and a Teletype terminal in Texas, and another

Teletype terminal in New Hampshire. Each unit is used a few hours a day, according to Kunio.

Being an on-line system, it was a "very rough one to bring up," he said, especially since "no one" had ever put such an application on a time-sharing vendor's network before. It has, however, been running "pretty smoothly" for the past three or four months, he said.

Complex Logics

Every company involved seemed to have problems when the project began, Kunio said. He had problems just coping with the complexity of the application logic and trying, for example, to keep track of where transactions were at any given point in time.

Happily, he said, GE software was supposed to handle the detailed control problems, in-

cluding temporary locks on data fields as they were being updated. However, the whole GE Network Service was so new when the Booth system was being developed, it was hard for both Booth and GE workers to fully understand how it worked.

To add to the confusion, Western Union had just taken over the TWX service from Illinois Bell, "and they didn't really know what they were doing" with the Teletype terminals, Kunio said.

As if Booth didn't have enough to do, development and implementation of the on-line system coincided with the in-house conversion from Honeywell gear to an IBM 360/22. The 22 isn't even a standard configuration, he noted, since it has the 32K core that is supposed to be maximum, plus another 32K bytes of "foreign core." Booth has a 64K

"Model 30" for the cost of a 360/25, according to Kunio.

Unpredictable Stock

Adding to his explanation of why on-line inventory control is so important to Booth or any fishery, he noted that the availability of new stock is "completely unpredictable."

To bring some semblance of order out of the unpredictable, Booth has been utilizing the forecasting, scheduling and production control and other management science, decision-making facilities of Computer Science Corp.'s Infonet time-sharing service.

Infonet includes good facilities for swapping between interactive and remote batch modes, which is very useful for the work Booth is doing. If GE's remote batch capabilities develop, Booth might put both the man-

agement tasks and the on-line order entry on the same net, Kunio said.

Although Kunio characterized GE service as more reliable than CSC's, he noted that CSC generally had better documentation, which is important to those using the management tools. In any case, the company has decided to stay with the two vendors for now, but recognizes there is an overlap of data between the applications.

Awkward Procedure

They have attempted to capture the order information that goes into the GE-based operation on magnetic tape cassettes, and then read the data into the Infonet system. This procedure presumably can work, Kunio said, but it is certainly awkward. And anything that is awkward

(Continued on Page S18)

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T/S Users Gain Communication Nets

(Continued from Page S13)

- Make programs available on a national basis
- Enable users to operate multi-level management information systems
- Centralize or coordinate the development and maintenance of programs for large groups of users
- Make the use of large computers available for special tasks
- Permit individuals to gain access to data previously filed for another purpose.

Some users have realized the RCNs can be used as communications networks for "in-house" CPUs, and that the vendor's computing power need not be used at all, according to the report. The 370/155 of the National Library of Medicine, for example, has been linked into Tymshare's service and can be accessed by terminals on the Tymnet lines. The work for the NLM machine is recognized and passed along by the Tymshare minis and the control software.

The Keydata network is used to perform conversational

order-entry, invoicing, and inventory control for Dupont's Organic Chemicals Department. Dupont's batch-oriented 360 in Wilmington, Delaware, is linked to Keydata's U-494 to produce statements, status reports and other high volume output.

Pontiac Division of General Motors has adapted GE's "inter-processing" to service its auto dealers. "Interprocessing" is a service in which a data base is used in batch-mode on in-house equipment and then electronically transferred to the RCN CPU for on-line inquiries or updating.

As TSIS co-editors Gene Gaines and Janet Taplin note in the conclusion of their special report, "the remote-computing networks provide the user with a total system approach to his data communications needs. The user gets a reliable, professionally maintained system with more redundancy, security and reporting than he alone can afford."

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A Riddle:

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Skeptics Were Justified

DP Managers Finding T/S Services More Useful Now

DP managers, once justifiably skeptical, are clearly responding to the maturation of business-oriented facilities on many of the time-sharing services. The number of subscribers to the services is growing, and the percent of "business" jobs being done by and for that expanded user base is also growing.

Apparently the stigma of depending on

"Time-sharing facilities can either supplement in-house DP capabilities or obviate the need for them."

"someone else's system" has faded because of managers' growing concern to make their operations more cost-effective and an awareness that some of the facilities just can't be matched on in-house equipment.

The remote-computing networks that have blossomed during the past year-and-a-half are spectacular in their own right, but more than that, they show the time-sharing vendors concern for the business-oriented user. The interactive "scientific" problem solver doesn't need network facilities—corporations with geographically diverse sites do.

Besides the networks, however, the time-sharing services have added, or enhanced:

- Remote and interactive compilers
- Interactive debugging systems
- Generalized information retrieval and report systems
- "Packaged" applications and dedicated networks
- Systems engineering and other technical support
- Remotely located card reader/punches and high-speed line printers for batch I/O
- "Deferred" service options, so job requests can be entered at the user's convenience and processed later at lower costs in non-prime time.

Remote Compilers

The remote compilers, sometimes with interactive features that issue diagnostic messages when an invalid entry is attempted, include Basic and Fortran, generally extended to support business functions, as well as Cobol and PL/1. Those services that are APL-based have, likewise, "stretched" the capabilities of that language to meet user "business" demands.

The debugging systems are often better than those available on the user's in-house equipment. They are intended to be highly interactive and report problems by citing user-coded procedure paragraphs and data names, rather than core locations which would have to be manually cross-referenced to the original code.

'Playing Games'

These debugging tools are so effective they sometimes lead programmers into "playing games," instead of just cleaning up their programs, according to John Thompson, vice president of Interactive Data Corp. The systems almost encourage programmers to take extra time at the terminal fine-tuning a program, instead of desk-checking it ahead of time, he warned a session of the DPMA Division 14 meeting last year. Thompson's comment takes on added significance inasmuch as his company offers one of these debugging systems.

The program development tools, compilers and debugging systems, are examples of how time-sharing facilities can either supplement in-house DP capabilities, or obviate the need for them. In the Boston area, for example, National CSS serves Index Systems, a DP consulting firm which has no in-house equipment other than a terminal, and John Hancock Mutual Life Insurance, which does have

its own installation (to put it mildly)!

Quick Reports

Users are finding time-sharing services extremely useful for information retrieval and reporting, especially "quickie" reports needed by management on a one-time basis. Non-procedural languages are available so staff workers without EDP training can extract the data they want and put it into formats that pinpoint what they want to see.

Many users have pointed to the fact that their corporate managers can now access data bases directly for decision-making information, and that if the data base is being updated on-line, the managers gain a timeliness that just wasn't possible before time-sharing.

The data bases are usually private, to be accessed and maintained only by their creators, but there appears to be a tendency towards setting up generally useful,

but specialized files that are made accessible to subscribers who have no responsibility for maintaining them. An example of this would be the Educational Resource Information Clearinghouse data base supported by Systems Development Corp. (and called SDC/Eric), which has been installed on the Tymshare Inc. network.

Dedicated Networks

Pointed even more directly at DP production work are the dedicated networks, and pre-defined applications installed on the general nets.

Keydata is one of the services dedicated to accounting application support, and the Psychological Corp. is a subscriber. Paul Rosensweig, the company's controller, said that the service seems able to supply better, more sophisticated and faster processing than he could get in-house from his parent corporation.

Application "packages" on the general services are often, but not always, tailored to the individual user's needs, taking into account billing methods, employee payment plans, general ledger charts of accounts and the like. In the end, the user need not even be aware of the language in which the application is written.

Most of the end-user departments within the organization of a subscriber on the APL-Plus or APL-Action services have never heard of APL, an industry observer noted, "They just go ahead and use the facilities."

Many users have taken note of the technical support the time-sharing services are now providing. At 20th Century Fox, for example, Robert Duvall was warm in his praise for the programming support he had received from Com-Share, in implementing a financial forecasting model system.

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Chase Manhattan Uses Services of Many T/S Vendors

Chase Manhattan Bank in New York is a long-time user of the interactive facilities and data bases available from many time-sharing vendors, to gain the capabilities it feels it cannot economically match in-house.

It has a lot of in-house equipment, most of which is batch-oriented and used for production work. To gain timely data retrieval and reporting, and other decision-making management support functions, the Chase had to turn to the time-sharing vendors.

The bank now uses some 13 or 15 different services and is getting more from them than it could get if it installed the work on an in-house time-shared system, according to Yell Newhall, second vice-president. The vendors have to keep up with the latest technology and tech-

niques, he said, since they are competing against one another. Chase in its development work would have a "captive audience" and no incentive to innovate, he added.

First Financial Language

In his own area, Newhall is using the Interactive Data Corp. service including, when appropriate, data from the Compustat "Standard and Poors" file and the First Financial Language (FFL). The problem with that data base is that it is geared to investment research, Newhall said, whereas his concern is credit research.

Interactive Data Corp. designed FFL to manipulate the functions of the Compustat data base and also provided software so that subscribers could write their own Fortran or Cobol programs to "grab" the data for use in their own programs. The data base is not as comprehensive as Newhall would like so he has written programs to add his own financial information to that supplied by Compustat, to do spreads, projections and the like.

Writes Own Programs

He added that his department does use International Data

XSTAT language to work with the data "but not to any great extent, because I usually end up trying to write my own programs so I know what is happening."

He has added present value analysis and comparative analysis routines to his library. As a result the Chase system is "very similar" to programs and a data base which City Bank is actively marketing and which is credit oriented.

Newhall's department is "pretty much limited to Interactive Data" because many of his programs are self-written and could not be transferred easily to some other service. He noted that he began working with Interactive Data Corp. in April, 1969, when the programs he wanted to use were too cumbersome for GE's Mark II network as it was then set up.

Eliminate Features

In any case, he said he was generally satisfied with Interactive Data. A salesman from another vendor offered to put Chase's programs on his net, so Newhall could compare the two services. The salesman came back and said he couldn't fit the programs on his machines unless

he could eliminate some of the features. "Since I already had a working system, with the features I wanted, I couldn't see the sense to that," Newhall added.

He said that other departments were using Interactive Data and also National CSS, Telstat, Call/370, Multicomp and Rapidata, in projects of which he was aware, and probably a number of others in test situations.

Newhall was reluctant to say which networks were being used for which jobs, until he could check with other user departments, but admitted that the international department is using GE's Mark II and its satellite link for credit analysis and planning for overseas operations, similar to the work he is doing on Interactive Data for domestic situations.

Decision-Making Tasks

Other decision-making tasks being handled by the time-sharing services included investment research analysis similar to that of many investment bankers, he said.

In another area, a service generates a bond quote sheet which the Government and Bond Agency mails to its customers so they will be aware of the bank's position. The same service provides analysis for yield and data for a bond swap operation.

Operational research, particularly related to global credit, is supported in time-sharing mode, and includes the "basic sorts of management science concerns," such as projections and cash flows.

The real estate department handled real estate investment trust activities, including tracking present values of real property, through the facilities of one of the vendors, he noted.

Biggest Use

The biggest use of all the time-sharing operations is in investment research since "if the bank can save a very small fraction of a percent on a bond, or a small percent on a stock, the service will pay for itself."

Chase's use of several time-sharing vendors is at once both accidental and intentional, Newhall said. It is accidental inasmuch as user departments have generally been free to pick whatever vendor they wanted, but they "usually decided on the basis of which salesman got there first."

The spread among the vendors has continued for several reasons. There has been a tendency for managers to decide the service they are using is more cost-effective than ones they test. The new ones may have better response time, at first, but this is likely to degrade as the system gets loaded. The installed service may carry a higher price tag than the proposed one, but managers are reluctant to shift from software they know works, Newhall said.

Shift Inappropriate

In some cases, Chase went with a vendor early enough so that the bank has the service on very good terms and transferring to another system, while it might improve the speed of the operation, might be inappropriate since it would cancel the low rate of the slower service.

Even if the services appear comparable and the operational rates are on a par, transferring to another service "probably means going to new hardware" and that almost inevitably means reprogramming and testing costs, and possible disruption in routines, Newhall explained.

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Standard Oil Uses National CSS System for Program Development

Some time-sharing vendors are willing to sell their capabilities as packages for installation directly on a user's in-house CPU, and there are cases where this has been done very successfully.

Standard Oil of California, for example, had been using the program development facilities, remote compilers and symbolic debugging systems on the National CSS service. Standard liked them so much, it bought them and the entire specialized operating system from the vendor, and installed them on its own 360/67 at corporate headquarters.

The company has a number of

subsidiary installations with a mix of 360 configurations. Standardizing the software used in these sub-centers has always been a problem, but the new system has a unique way of handling it.

Since the 360/67 operates in virtual machine mode, Standard Oil is able to write one master program with the logic that all the centers should use. By compiling the same program several times, each tailored to reflect one of the target 360 configurations, the company is able to distribute the logic in a form that will be usable at each location.

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New Small Systems Better Than Larger Ones of '60s

Today, the user of a small system — IBM System 3, NCR 50, Honeywell 58, even the Univac 9200 — has a more powerful tool than the user of a small- to medium-scale system in the early 1960s.

The systems all tend to have better languages, more diverse peripherals, more core storage to work with, more system capabilities, some sort of operating system support and a reasonable source of application programs, if the user wants to get right into production without developing his own programming logic.

Anyone who doubts that languages are better need only compare, for example, the Cobol, Fortran and RPG-II available now on the System 3, with SPS, Autocoder and RPG that were used on the 1401. RPG (and the others) has come a long way.

The operating systems, although they are still limited, tend to ease the handling of production and programming, so that users can take advantage of the faster speeds and more complex configurations of the newer machines.

User Attitudes Changed

Certainly the technical expertise that has grown up in the past dozen years on the part of the vendors has a lot to do with the brighter picture for the small user. But it seems likely a change in the users' attitude has helped too. As in other aspects of activity, the new user has apparently learned to ask questions and to get answers. The vendors have to come up with good hard facts about their systems right from the first announcement.

Imagine, if you can, Burroughs using the first two-and-a-half pages of the news release announcing the B1700 to describe the closed circuit television hookup by which they were able to make the announcement simultaneously all across the country. Did they? Certainly not. But IBM did, when it an-

nounced the 1401 in 1959.

System 3 is undoubtedly the most visible of the current small systems and there are two good reasons for that. First, the system is an IBM product and IBM has a rather overwhelming sales force, so there are lots of S/3s installed.

In addition, however, the fact that IBM is the only unbundled hardware vendor means that a number of independent software houses have been offering their products to compete with IBM's.

Two separate vendors, for example, offered versions of Fortran and Cobol for the S/3 before IBM could get its language processors out and available. The independent offerings may not have been as good as IBM's, but they were there for the user who wanted to start up in languages other than RPG-II.

Free Software

The bundled small systems users get their software without cost from the hardware vendor. So there are few independent software houses who seek to provide a new application or an operating system enhancement for any bundled systems.

But if the S/3 users are surrounded by a growing circle of software salesmen, apparently they are sharp enough not to accept everything they see and read. The S/3 users surveyed last year indicated that they had little use for the half-way approach to program development represented by IBM's Application Customizer Service. So very little has been heard of that service lately.

However, numerous Field Developed Programs (FDPs), generated by IBMers, have been made available. These application packages are operational, and the users are apparently utilizing them even though there is little in the way of support for them.

While the users indicate, by their acceptance of the largely

(Continued on Page S/18)

DOS Remote Batch Communications

Do you have, or are you considering, remote batch communications or RJE? If so, consider this package. With very modest core and disk requirements it makes all remote terminals appear as local devices to the central CPU. This means:

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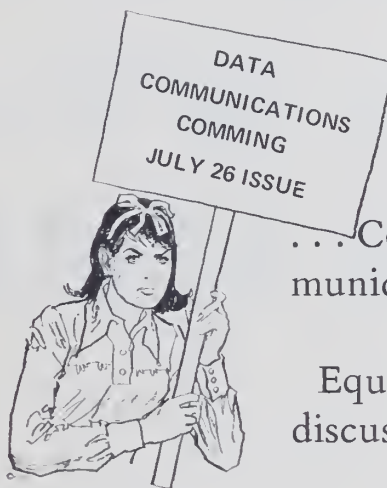
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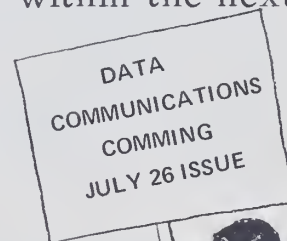


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Wiser Users Adapt To Better Systems

(Continued from Page S/17)

unsupported FDP, they can solve programming problems if they arise, they know they are not alone as their compatriots were in the early 1960s.

Users group meetings for all the vendors have been well attended and, in the case of the S/3, at least two independent groups of some stature have come into being, in addition to a number of regional groups.

Nasu

The National Association of System/3 Users (Nasu) has been in operation for some time now, and its newsletter provides a good interface between user, hardware vendor and independent suppliers of both hardware and software. Coding techniques are exchanged and problems aired so they can be settled quickly.

A prime example of the impact Nasu or any similar organization can have was the printer change IBM field-installed last year to "make the system last longer." As a letter to Nasu pointed out, the change saved the equipment (if it did) at the cost of additional run time for most print jobs. Added run time meant inefficiency for the here-and-now and the users howled about it enough so that IBM backed down and returned the printers to their original condition.

The other organization that plans to work with S/3 users on a national scope, called Group/3, is only a couple of months old. Monthly dues are collected and the group is expected to supply members with software (starting with an Assembler that is ready now) at monthly rates distinctly lower than IBM is charging for comparable capabilities.

The sophistication of some small system users may be a reflection of the small system's place within a large scale installation. But there are many situations in which the imagination of the user is not necessarily triggered by exposure to bigger hardware systems.

In Brentwood, California, for instance, the owners of the Vaquero and Mapes Farms have a Quantel V mounted on the back of a truck that tours the lettuce fields to pay the workers and complete the payroll accounting on the spot.

Booth Uses GE, CSC

(Continued from Page S/14)

has the potential for being mishandled.

A more imaginative solution to the swapping problem, but one Booth has not yet tested, would be based on a "conference call" arrangement. From Booth's corporate offices, a call would be placed so that, in addition to the entry point at Booth, the two CPUs would be able to "talk" to each other.

Kunio said he doesn't know right now how they will resolve the transfer from one service to the other, but he noted that the order-entry and inventory control application is probably the only one the company will consider for on-line implementation, at least in the foreseeable future.

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THE NEWSWEEKLY FOR THE COMPUTER COMMUNITY

Why don't you use GRASP?

An open letter to Data Processing Officers, EDP Managers,
Systems Programmers and Operations Managers



SOFTWARE DESIGN, INC.

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Dear Sir:

If you are among the hundreds of DOS installations who are GRASP users, we thank you for your support and for the many kind words you've given us. If you are not a GRASP user, you owe it to your company and yourself to honestly face the question: "Why not?"

Maybe your answer is, "We don't need it."

This implies that your present equipment handles your work load quite adequately--even at peak periods, that your programmers get all the development time they can use, and that you rarely pay overtime for personnel or equipment. It also means that you cannot save any money by getting rid of some excess hardware.

Maybe your answer is, "We get POWER for nothing."

Without even considering whether the core, disk and partition that POWER consumes are free, the important fact remains that POWER IV and GRASP/II are completely different things. They both spool (they even do that in completely different ways), but there the similarity ends. GRASP/II is a complete DOS enhancement to increase the productivity of the machine. When fitted with Partition Balancing, Resident Transient Area, PCI-Fetch, Load Libraries with Overlay Phase Directories and, with the obvious advantages of Early Device Start, GRASP/II out-performs POWER IV by a wide, wide margin. That machine is, after all, a capital investment by your company. The more it produces, the greater your profits.

Now, maybe you have the ultimate answer: "I don't believe anything I read in ads, or anything a salesman says, or anything other users say."

Fine. There is lots of value in skepticism, especially when it concerns software. We would like to prove what we claim. In most cases, GRASP will be running on your system in less than 15 minutes, without modifying standard IBM software one whit.

Maybe you have some other reasons for not being a GRASP user. But with GRASP bringing so much benefit to so many DOS installations, you should have all the facts when you answer the question: "Why not?"

Let's talk it over..

Ken Kert

Kenneth W. Kert
Vice President

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Ferguson on System 3

Where Will the System 3 User Go From Here?

By David E. Ferguson
Special to Computerworld

Computer people are a strange breed. Before they can arrive at where they're going, they begin to wonder where they'll go after they've arrived.

For instance, when IBM's System 3 was first announced and before the first installation was made, the question was asked: "Where do we go from here?" And it's a question that has persisted.

What makes this an important and truly significant question is the fact that the System 3 is totally incompatible with the IBM 360 and 370 lines and, naturally, with any other computer from any other manufacturer.

One of the most frequently asked questions by our members in Group/3 is: "Where do I go when I exceed the capacity of my system?"

First of all, IBM is attempting to head off the debacle created by an upgrade before it happens. It is, for instance, emphasizing that S/3 users should utilize RPG for programming. This is inherently wise but poses some disadvantages as well as advantages.

Most S/3 users are relatively inexper-

"Ferguson on System 3"

This new column, "Ferguson on System 3," written by David E. Ferguson, president of Group/3 and former president of Programmatic, will be devoted to the problems facing small systems users.

enced, are often first-time users and don't have a programming staff. Therefore, because they really can't use Cobol or assembly language, the philosophy of using RPG instead is a sound one and will be helpful if they really adhere to it.

The problem, however, is really one of education. Bear in mind that the S/3 user is predominately a first-time user. And the chances are he does not know how to program in RPG and will have to learn it.

He can do this by attending training classes at any of the IBM educational centers throughout the country, but this becomes rather expensive due to the time and travel expenses involved.

In addition, a majority of S/3s are installed in areas fairly well removed from urban centers which aggravates the time and money problem even further.

As a result, most S/3 users will have to rely on IBM "programmed instruction" manuals to learn RPG. This is not entirely satisfactory, by any means, but will at least allow the user to become a beginning RPG programmer.

The most efficient programming technique, however, is machine language (or assembly language which is another form of the same thing).

Machine language offers economies in both speed and space and extends the capabilities of the S/3 beyond those which exist at the RPG level. Unfortunately, the problem of difficulty in learning assembly language is considerably greater.

Assembly language provides incredible improvements in speed and storage. Significantly, speed is usually not a problem.

Storage requirements, on the other hand, can be quite important, in fact much more important than the average S/3 user realizes.

If he is programming in RPG and runs out of storage space, he simply buys more core. He is told he has to do this and doesn't recognize that there is an alternative.

The RPG program, for instance, which requires 16K of core might require only 8K if coded in assembly language.

So much, at the moment, for software. Another obvious answer to the question of growth is one of hardware.

The preponderance of early S/3 users had small systems with limited capability. Maybe half of the users had disk systems and more of these were single plate.

16K was considered to be a large core storage. The maximum printer speed was only 300 line/min. Maximum disk storage was about 9 Mbytes. There was no tape

Small Systems User

available. And there were no 80 column card readers.

But that situation has changed dramatically and will continue to change in the future. Now, an S/3 can have close to 90 Mbytes of disk storage and up to 64K of core.

An 1,100 line/min printer and 80 column card equipment are available. And within a few months, IBM will be delivering magnetic tape systems.

Now, if we put these two things together — the hardware and the soft-

ware — the picture begins to become clearer.

As the user gets into more sophisticated hardware, he will, almost unquestionably, have more sophisticated people on his staff.

And one day, some bright young person will say, "Hey, that's really a computer and I can program it in computer language."

Merely by writing some key applications or subroutines in assembly language, the user will be able to increase the computing capability of his machine by at least another factor or two. This may make it more difficult to convert to another computer line, but conversion will be unnecessary because of the increased capacity of the machine.

The answer to "Where do I go from here?" should now be obvious.

The user will grow within the framework of the System 3 because it's the S/3 that's going to do the growing.

If the time ever comes when a System 3 user graduates (or to expose my own

prejudice, flunks) to a 370, IBM has attempted to make the transition as smooth as possible by restricting the user to RPG or some other higher level language. However, this is fraught with difficulty.

Upgrading, even on compatible equipment, is not all peaches and cream. Language translators are never completely compatible and operating systems are anything but.

Just going from DOS to OS on the same computer can be a traumatic and mind-boggling experience.

But these are hazards I don't think the S/3 user is going to have to be exposed to.

System 3 users will shortly be the largest single computer population in history.

Hardware will proliferate. Users will become more sophisticated in programming. They will have plenty of room for growth directly within their systems.

The answer is a simple one — fight, don't switch.

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The Professional's Viewpoint

DPMA Replies to Questions Posed by CDP Survey

In a Professional's Viewpoint article May 17, Mike Ingram of the Society of Certified Data Processors summarized the results of a questionnaire answered by readers. This week the Data Processing Management Association offers its own answers to the questions asked about the Certificate in Data Processing (CDP), which it sponsors.

DPMA's Answers

1. Question: Should the CDP examination be made more difficult?

May 17 article "suggestion": "The CDP exam must be kept current by constantly updating the questions."

Comment: It is. The position of council on CDP exam development from 6th meeting - April, 1965 is:

"To determine if the content, i.e. balance, of the examination does in fact measure the current knowledge required of a practitioner of the field, it is mandatory that we annually review the content of the exam so that the progression of the field and the content of the examination do change in a parallel fashion."

The present procedure for constructing a CDP examination includes:

1. Questions from the previous CDP examination are analyzed and those that are no longer relevant or do not meet the minimum difficulty and discrimination criteria are separated for revision or elimination. The rest of the questions are returned to the question reservoir.

2. Each council member completes a question distribution form by which he specifies the number and difficulty of questions in various categories of the study outline he believes should constitute the make-up of each of the five sections of the examination. The individual question distributions are reconciled and the composite is examined, modified and approved by the council.

3. Questions are selected from the question reservoir which correspond to the requirements of the composite questions distribution. Questions are selected for relevancy first and then for performance judged by the difficulty and discrimination indices.

4. The draft examination is sent to each council member for review and comment. Questions are modified as required and the draft examination is presented to the council at the fall meeting.

5. The council as a group re-examines the draft examination during the fall meeting and after making any final changes or modifications, approves the examination for printing.

2. Question: "Should education in 'non-relevant' subjects be counted (i.e. as part of qualification for examination)?"

May 17 article "suggestion": "Non-relevant education should not be counted for possible examination entry requirements."

Comment: It isn't. Currently there is no education requirement. In the future, education may be substituted for experience according to the following guidelines established by the certification council during the April 13 to 15, 1972 meeting:

"Certification council adopts the academic equivalence policy detailed for evaluation as partial fulfillment of the current experience qualifications specified in Section II, paragraph A, subparagraph 1 (page 5) of the 1973 *Certificate in Data Processing Study Guide*. The specific amount of academic credit allowed will be determined by the CDP credentials committee based upon experience equivalences. The decision of the CDP credentials committee will be binding.

"As an example: An individual with a Bachelor's Degree in Computer Science from a suitably accredited institution and two years of practical experience in computer-based information systems would be eligible.

"In order to qualify, an official transcript must be received at DPMA International Headquarters on or before the application deadline date."

2a. Question: "How much DP education should substitute for experience?"

May 17 article "suggestion": Nothing specific.

Comment: In the future, education may be substituted for experience according to the following guidelines established by the Certification Council during the April 13-15, 1972 meeting: [See guidelines under question 2].

3. Question: "Should broad background be favored over specialization?"

May 17 article "suggestion": A broad background is preferred over specialized skills in satisfying exam entry requirements.

Comment: We probably would have to agree that a broad background is preferable over a specialized background. However, the *Computerworld* article does not differentiate what kind of background we may be talking about - experience - education - what?

The broad background of a data processing generalist best equips an individual for the CDP examination, in our opinion.

One might say the examination is evidence of a broad background.

Since *Computerworld* didn't feel obliged to specify broad background in "what," neither are we obliged to differentiate. The implication is probably the candidate has a broad background in both - the

academic and experience plane.

On this point the certification council during its meeting of September 1968 and in a general discussion, came to the conclusion that the direction being taken in expanding the CDP examination was, in effect, to move the decision point between specializing in management and specializing in techniques upward.

It was the consensus of the council that the CDP examination will expand to cover the total spectrum of the subject important to the field of data processing. Specifically this would include:

1. Additional questions covering knowledge expected of an individual in the area of general management.

2. Additional questions dealing with: a. hardware, b. software, c. quantitative methods, d. etc.

The council concluded that the management questions would be measured, or given the weight, equal to each of the other segments of the examination.

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Canadians Join DTSS

HANOVER, N.H. - Twelve Canadian colleges and high schools have joined the Kiewit Educational Time-Sharing Computer Network operated by Dartmouth College.

The Canadian institutions join some 50 other colleges and high schools in the United States who use the system.

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For Unemployed Minorities**Free Job Training Center Opens**

NEW YORK — A new job training center which will provide free training, counseling and placement for careers in data processing to unemployed and underemployed people from New York's minority communities was dedicated last week in Harlem.

The modern, fully equipped facility, formerly a warehouse storage loft at 213 E. 125th St., is sponsored jointly by the Opportunities Industrialization Center (OIC) of New York, IBM, and The Sperry & Hutchinson

Co.

In praising the establishing of the new center as an added resource in the community, Borough President Percy Sutton said, "It is good to see evidence of a positive relationship between industry and a local community-based organization. It helps us all to better keep the faith."

The new center offers training for jobs as computer operators, programmers and keypunch operators. It is open to people based on their economic need and aptitude.

Training at the center for the first two years of the project will be under the supervision of IBM. The instruction staff provided by IBM includes an instruction manager and four instructors who developed the course materials and are teaching full-time at the center. They are IBM employees who were selected for their experience in teaching, systems engineering and programming.

IBM also has equipped the center with a 360/40, 17 key-punches, two data recorders, a verifier, a sorter, a collator and a reproducer.

To help establish the center, the S & H Foundation, sponsored by The Sperry & Hutchinson Co., contributed \$25,000.

The selection, counseling and placement of trainees is being coordinated by OIC's recently formed Computer Training Division, under the general supervision of Harlem OIC Branch

Manager James W. Lytle.

OIC plans to assume complete responsibility for the center at the end of two years. During the second year of operation, it is expected that OIC personnel will be exposed to the teaching of computer training and will learn the techniques necessary to become proficient in giving instruction in the various courses. Consultation in training and technical matters will be provided by IBM during the third year of operation, according to an OIC spokesman.

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Tapes made on Novar off-line source data devices, including the 5-30 Automatic Tape Typewriter and 5-12 Recording Typewriter, can be transmitted via telephone lines by playing them on Novar 5-50 or 5-60 communication terminals. The 5-50 transmits in the Selectric correspondence code, the 5-60 in the ASCII code. Transmission rates available up to 2400 baud.

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(415) 966-2272**Voice Response
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GAINESVILLE, Fla. — Long lines and "hassling" with the computer during registration may become a thing of the past at the University of Florida.

James G. Thompson, a recent graduate of the Department of Industrial and Systems Engineering, has been conducting research with a "talking" computer which is expected to simplify the quarterly Herculean task.

Thompson said, however, that the system is not an immediate possibility. The Registrar's Office must study the research, determine costs and evaluate feasibility.

If the system is acceptable to the University, students who will have to use a Touch Tone phone, will be given a number to call for the registration process. When the number is dialed, a woman's voice will say "enter section numbers now."

After the student has completed entrance of numbers assigned to each course he plans to take, the voice will inform him of the sign-up.

The words will be spoken at approximately 100 words a minute — roughly the average number of words a minute spoken by humans.

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The Novar 5-30 Automatic Tape Typewriter and the 5-12 Recording Typewriter are designed for use in multiple machine installations where all units must be able to prepare tapes, but transmission of the recorded data can be handled by one or several Novar communication terminals—such as the models 5-50 and 5-60. Highly efficient installations that also save a lot of money.

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Education Notes

All of the California State Universities and Colleges tied into the statewide computer system will have the capability of simultaneous batch and terminal transmission at the end of this week.

In the past stand-alone computers in the system did not have this capability, while schools with IBM 360/20s had the capability for only two time-sharing terminals. The stand-alone transmission rate will now be 4,800 bit/sec; and the rate for the other schools is 4,320 bit/sec.

With the new service, additional terminals can be added to the line. However, each terminal over two will degrade the Remote Job Entry transmission rate by an additional 140 bit/sec, so that a machine with 10 terminals will transmit at 3,200 bit/sec.

A new degree, Master of Computer Science, will be offered by the University of Dayton, Ohio, this fall.

The program is aimed primarily at students that have already received degrees in areas outside the computer sciences to upgrade their computer skills.

Requirements for the degree are 18 credit hours in computer science and 12 credit hours in computer science or other areas. The courses are offered in the late afternoon and early evening.

A symposium on Computer Education for Developing Countries is scheduled for August 6-12 in Rio De Janeiro.

Directed towards decision makers in government and industry as well as computer specialists and educators, the session will cover long range planning and manpower needs, continuing education, education for DP executives and managerial staff, and computer education in elementary and secondary schools.

In addition, the meeting will address such topics as computer education at the college level and international education.

The Fourth International Conference on Computers in the Undergraduate Curricula will be held at the Institute for Educational Computing of The Claremont Colleges, Claremont, Calif., in June, 1973.

The meeting, partially sponsored by the National Science Foundation, will emphasize the use of computers in the humanities and in community colleges.



Instructor Frank Ferraro (with beard) supervises the operation of the mini by Steve Riccitelli, Louise Jakstonis, Diane Wilkenloh, and Ed Breit.

High-Schoolers Like Mini

OCEANPORT, N.J. — More than 20 Monmouth County high school students recently finished a 15-week computer programming course, offered free by Interdata, Inc.

The students met each Saturday at the company's training center for a 4-hour session followed by plenty of homework.

Says training manager Dick Vivian: "I just can't tell you how impressed I am with these kids. They were not here working for a grade; they were working because they are genuinely interested in the great potential computers have for building a new and better society."

"When these young students first started, they asked questions like, 'What does it do?' Now they want to know why it's done a particular way instead of another way. And they are really giving us all something to think about," according to instructor Frank Ferraro.

The principal project for the students was to show their understanding of the principles involved in data processing by writing their own computer program. As might be expected with a group of teenagers, the students elected to try their hand at a program that would set up a computer dating service.

Position Announcements

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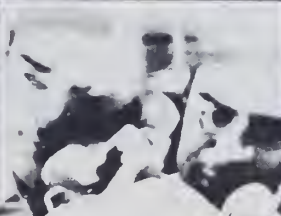
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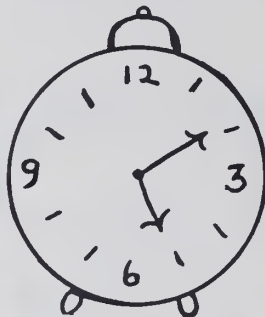
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CI Notes

Calcomp Claims USSR First

ANAHEIM, Calif. — Calcomp claims that "the first flatbed plotting system ever sold in the U.S.S.R." has been purchased for the Ministry of Chemical Industry, Department of Automation Projects, Moscow.

The purchase, made at the Computer '72 show at Sokilniki Park, Moscow, is subject to normal export approval by the U.S. Department of Commerce.

Calcomp has sold plotters in the U.S.S.R. before but never a complete system. Previously Soviet technicians interfaced Calcomp plotters with computers for direct, on-line operations.

DEC-Singer Sign Pact

MAYNARD, Mass. — Digital Equipment Corp. has announced a three-year OEM multi-million dollar product contract for up to 119 computer systems with the Singer Co., Simulation Products Division.

It's one of the largest OEM contracts ever awarded to DEC. DEC also announced that it has shipped a PDP-11/45 computer system under the OEM agreement to the division for controlling a real-time multiprocessor training/simulator system for the U.S. Navy.

2048-Bit MOS RAM in Production

SUNNYVALE, Calif. — Advanced Memory Systems, Inc. is claiming the first production 2K-bit MOS dynamic RAM.

The AMS 6003, priced at \$20.48 each in distributor quantities of 250, is in volume production and offers 360 nsec maximum access time and 595 nsec maximum cycle time.

Supershorts

A marketing agreement under which System Kaihatsu Kabushiki Kaisha (SDI) will handle the installation and support of all the ASI-ST family of general-purpose computer software products in Japan has been announced by SDI President Hisashi Nagatsuma and Donald H. Sundeen, president of Applications Software, Inc., developer of ASI-ST.

General Automation, Inc. has announced that Koyo Seiko Company, Ltd. has been appointed a distributor for GA's computer-based industrial automation products and systems throughout Japan and Korea.

Greyhound-IBM Suit

Decision Expected Soon in Antitrust Move

By E. Drake Lundell Jr.

Of the CW Staff

PHOENIX, Ariz. — The Greyhound Computer Corp. antitrust suit against IBM will probably be concluded within a month when a jury of three men and three women decide the fate of IBM and the computer leasing industry.

Judge Walter Craig of the U.S. District Court here had hoped the case would go to the jury by the end of June, but admitted a July 14 date was more likely, a prediction that appears to be holding even though testimony is taking longer than expected.

In the action Greyhound is seeking damages of at least \$35 million, an amount it claims it lost due to actions on the part of IBM which it alleges violated the Sherman Antitrust Act.

If Greyhound is successful, most other leasing companies will probably file similar suits, so the present case is a test of future actions.

A victory for Greyhound would also give impetus to the other antitrust actions now pending, most notably that filed by Control Data Corp. vs. the computer industry giant.

The strategy in the case is now clear. Greyhound is attempting to convince the jury — considered a "good" jury by lawyers

for both sides — that IBM in fact does control the dominant segment of the industry and that it has used that position to stifle competition especially from the leasing firms.

For example, Greyhound lawyers quoted a 1965 memo by Vincent Learson, now Chairman of IBM, which indicated that leasing companies were costing IBM \$83 million a year in lost revenues.

IBM's Market Share

Greyhound is calling witnesses from the computer industry research firms to try to peg the share of the market controlled by IBM and is calling on executives of leasing companies to show the effects of recent IBM actions, most notably the introduction of the 370 line, unbundling and the fixed term rental plan.

Greyhound is claiming the prices set for the 370 have made it impossible for the leasing firms to lease those machines, thus forcing them out of the business after they can no longer lease 360s.

For example, John H. Smith, president of Computer Leasing Co. said recently his firm had decided not to purchase any 370 equipment because it was "not a good investment for a leasing company" and he admitted the firm would ultimately go

out of the computer leasing business if it can't buy the new technology.

For its part the IBM lawyers are grilling witnesses closely on market share, attempting to show that IBM is really not overwhelmingly dominant in the business.

IBM notes that in 20 years the industry has grown from 11 firms to over 1,750 and insists on exploring the revenues of the entire industry, not just the main-frame makers.

Using the figures provided by the market researchers, IBM is attempting to show that when the entire market is considered, including service bureaus, software houses, etc., it does not have a dominant share of the market.

In another area, IBM is also attempting to show that it is in fact losing its share of the market and that many firms are constantly entering the business.

'Unrealistic Expectations'

At the same time, the firm claims the leasing companies brought all of their present problems upon themselves by unrealistic expectations and accounting practices.

In his opening statement, Thomas Barr of Cravath, Swaine and Moore, the IBM trial lawyers, noted that the leasing companies had been good customers of IBM and "why should IBM want to put them out of business?"

At the same time he noted IBM lent leasing companies over \$200 million, of which \$60 million is still outstanding and which it doubts it will recover fully.

He also noted users and others are in fact purchasing 370 equipment — 30% of machines shipped so far have been purchased compared with half that number in the same time on the 360, he said.

IBM's success in the business, he said, is simply the reward it deserves for taking a large risk on computers and putting its resources into the development of that market.

The case is extremely complicated, with even the lawyers admitting in their opening statements, they do not fully understand all of the ramifications.

The jury not only has to gain some feeling for the jargon of the industry, such as disk drives, OEM and CPU, but it also must get a feeling for some complicated accounting problems, such as full payout, operating leases depreciation of computer equipment, base prices and percentages of IBM rental rates.

None of the jurors has any experience in the computer industry although Phoenix does have a lot of computer activity in the area.

Software Market Decline Seen, IBM Getting Larger Market Share

NEWTON, Mass. — User expenditures for software — both custom designed and packages — will be down by around 10% this year, according to an industry research firm here.

Total software expenditures will be \$404 million in 1972, off from the \$448 million spent last year, International Data Corp. (IDC) said recently.

And while the outlook is gloomy for the entire industry, it is even more so for the independents, as IBM will grab an ever increasing share of the market, IDC indicated.

Users will spend \$205 million with the independents for analysis and programming this year, off 26% from the figure registered last year, while they will increase their expenditures for the same services with IBM by 8% to \$73 million.

The independents will show a 21% rise in dollar volume from the sale of packages to \$85 million, but at the same time IBM will experience a 30% rise in the sale of packages, bringing its total to \$41

million from these sales.

At the same time, the study notes that users plan to increase their in-house capabilities in the software area by about 12%.

Systems/utility packages have been the most successful to date, the firm said, with total revenues of \$110 million, while application packages have brought in only \$90 million to the various manufacturers.

In the first category, program documentation and generation programs accounted for \$30 million of the revenues; report generation and file maintenance packages, \$20 million; 360 enhancement packages, \$15 million; systems simulation and performance measurement, \$15 million; and media conversion, \$10 million.

In the applications category, the firm reported payroll/personnel packages have generated revenues of \$25 million; banking industry packages, \$25 million; general accounting packages, \$15 million; and engineering/scientific packages, \$10 million.

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Datarcraft Shows 24-Bit Mini

FORT LAUDERDALE, Fla. — Initial delivery has begun on a 24-bit computer designed to bridge a "price/performance" gap in the marketplace, according to Datarcraft.

The DC 6024/5 is oriented toward applications requiring real-time control and complex calculations. With the 24-bit word length the computer can directly address 32K words or indirectly up to 64K words. Cycle time is 1 μ sec. Standard are 592 hard-wired operating codes.

The basic price of \$10,900 includes CPU

closure, 72 inches high, 19 inches wide and 30 inches deep.

The DC 6024/5 specification calls for: full parallel binary arithmetic; single address; multi-access bus structure; fully buffered I/O channels with shared peripheral units; and multiple CPU capacity.

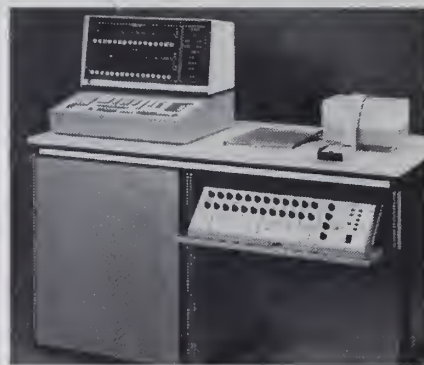
Datarcraft can be reached through P.O. Box 23550, 33307.

Semiconductor Test System Bows

CHERRY HILL, N.J. — The first system in a family of semiconductor memory test systems designed for the semiconductor memory manufacturer or user has been introduced by Semiconductor Test Systems (STS).

Called the Venture II, the system performs functional tests on RAM, ROM, and shift-register memories. The use of high-speed ECL logic, a high-speed instrumentation test head, address and data word "pipeline" registers allows a true system test rate of up to 10MHz, the company said.

The highlights of the system include:



STS Memory Test System

independent Read and Write cycle times, separation of address sequencing and data formatting into two logic systems, micro-program control and automatic margin test capability. A line of drivers, comparators, and sense amplifiers are configured in a remotely locatable test head to meet the requirements of MOS, TTL and ECL memories, the company said.

Price of the system is in the \$40,000 to \$60,000 range, depending on configuration. Availability is 90 days from Computest Corp., 3 Computer Drive, 08002.



Kennedy 9000 Tape Drive

Other OEM Products

GE is now offering 90-day shipments on its new GE-PAC 3010/2 process control systems in most configurations. The 90-day delivery is for a functioning system including process operator communication, sensor signal conditioning, and standard software oriented to the application.

Designed for system adaptability, the CPT Input/Output Typewriter from CPT Corp., Minneapolis, enables system interface to be at TTL/DTL compatible logic levels. An electronic keyboard has been incorporated in the typewriter, which costs \$1,350 in lots of 250.

Features of large, high speed tape transports are offered in the Kennedy Model 9000 drive. Available in tape speeds from 12-1/2 to 37-1/2 in./sec, 9-track 800 char./in. and 7-track dual density, Model 9000 is priced at \$2,500 in quantities. Delivery is 30 days.

A new keyboard design for data entry terminals developed by Raytheon Co., the Capscan, uses capacitive switching techniques to provide high reliability for under \$90.

The Executerm desk top computer terminal from Car-Mel Electronics, Inc., Los Angeles, is plug interchangeable with standard Teletype terminals. Nine inches wide, 10 inches high and eight inches deep, the display presents 16 lines with 32 char./line on a six in. CRT. A full typewriter style keyboard is mounted in a drawer at the base of the walnut-finished unit.

The Model 204 video terminal controller from Ann Arbor Terminals, Ann Arbor, Mich., is a low cost replacement for hardcopy data capture terminals and industrial display/controllers. It is available with serial and parallel R033- or KSR33-equivalent interfaces, and features built-in buffer and refresh memories. It costs \$795 (single quantity).

The Model 3131-12 non-contact gaging system from ADE Corp., Watertown, Mass., provides complete go/no go analysis of all computer disks — at any operating speed. Its electronics signal processing simultaneously measures dynamic disk dimensions for displacement, axial velocity and acceleration and peak deviation from datum reference, the company said. It is priced at \$7,250 plus probes.

Tektronix, Inc., Beaverton, Ore., announced an optional horizontal time base for the Tektronix 603 storage display monitor and 604 display monitor. Measurement flexibility is greatly expanded with calibrated sweep rates and adjustable sweep triggering. Sweep rates are from 1 μ sec/div to 0.1 sec/div in six calibrated steps and are continuously variable between steps (uncalibrated) to approximately 1 sec/div.

General Electric's Aircraft Equipment Division, Utica, N.Y., has expanded its line of aerospace computers with the addition of a 16-bit computer, the modular and microprogrammed CP-16.

New OEM Products

with 4K of memory; five general purpose registers (three indexable); hardware multiply/divide/square root; priority interrupt control; four levels of external priority interrupt; display panel and power supplies. This configuration is mounted within a self-contained rack en-

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Training Key to Good Service, Sorbus Says

By Molly Upton
Of the CW Staff

KING OF PRUSSIA, Pa. — Independent manufacturers are increasingly turning to outside firms for maintenance services of their products, rather than starting their own in-house nationwide organizations.

One such firm is Sorbus, which currently services products of about 20 different firms.

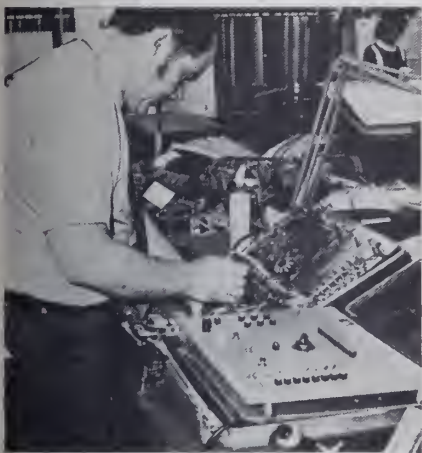
Since being spun off from its parent Management Assistance Inc. in 1971 as a service company, the percentage of Sorbus revenues from outside firms has risen to between 60% and 70%, according to Gerry Stronach, manager of marketing services.

To ensure quality service, Sorbus demands product support and documentation from the manufacturer, and education of two of Sorbus' top technical people. Sorbus then assumes the responsibility for educating field engineers and trainees on the subscriber's units.

Good maintenance depends largely on the education of the man in the field, according to Stronach.

The Sorbus education facility operates up to 20 different courses. Usually there are about eight classes operating simultaneously, with a total of 40 to 50 students, according to Gilbert Dillinger, training coordinator.

Trainees must pass entrance exams and have some type of electronics background, generally gained at a technical school or in the armed services.



CW Photos by Mary Upton

Jerry Walker uses a special CRT tester designed by Sorbus to check out equipment.

Trainees usually start off working on unit record equipment, where they acquire some experience working in the field and dealing with customers. Then they return to school for further specialization on subjects such as telecommunications, 360 compatible equipment, or stand alone devices.

Training for servicing memories is divided into two categories, depending on whether it's intended for extended core, or regular memory.

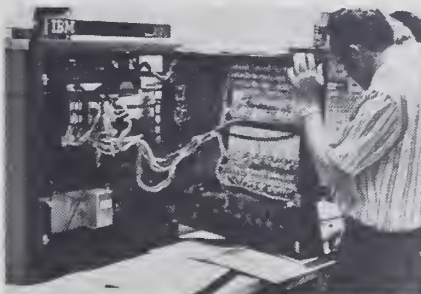
Training lasts either two or six weeks, for extended core, while training for servicing regular core boxes takes four days on trouble-shooting I/O ports connected to the adjunct memory, and six days on the core itself.

As an example of the variety of courses offered, training for the Sycor terminal lasts two weeks; the Basic 4 system, five weeks; Unitech minicomputer, three weeks; and three weeks on Tracor disk and controller.

By maintaining its own management information system and performing analyses of calls by territory, individual rep, and type of equipment, Sorbus keeps abreast of trends in maintenance needs on specific equipment.



Sorbus maintenance engineers take notes on the operation and servicing of Sycor terminal units.



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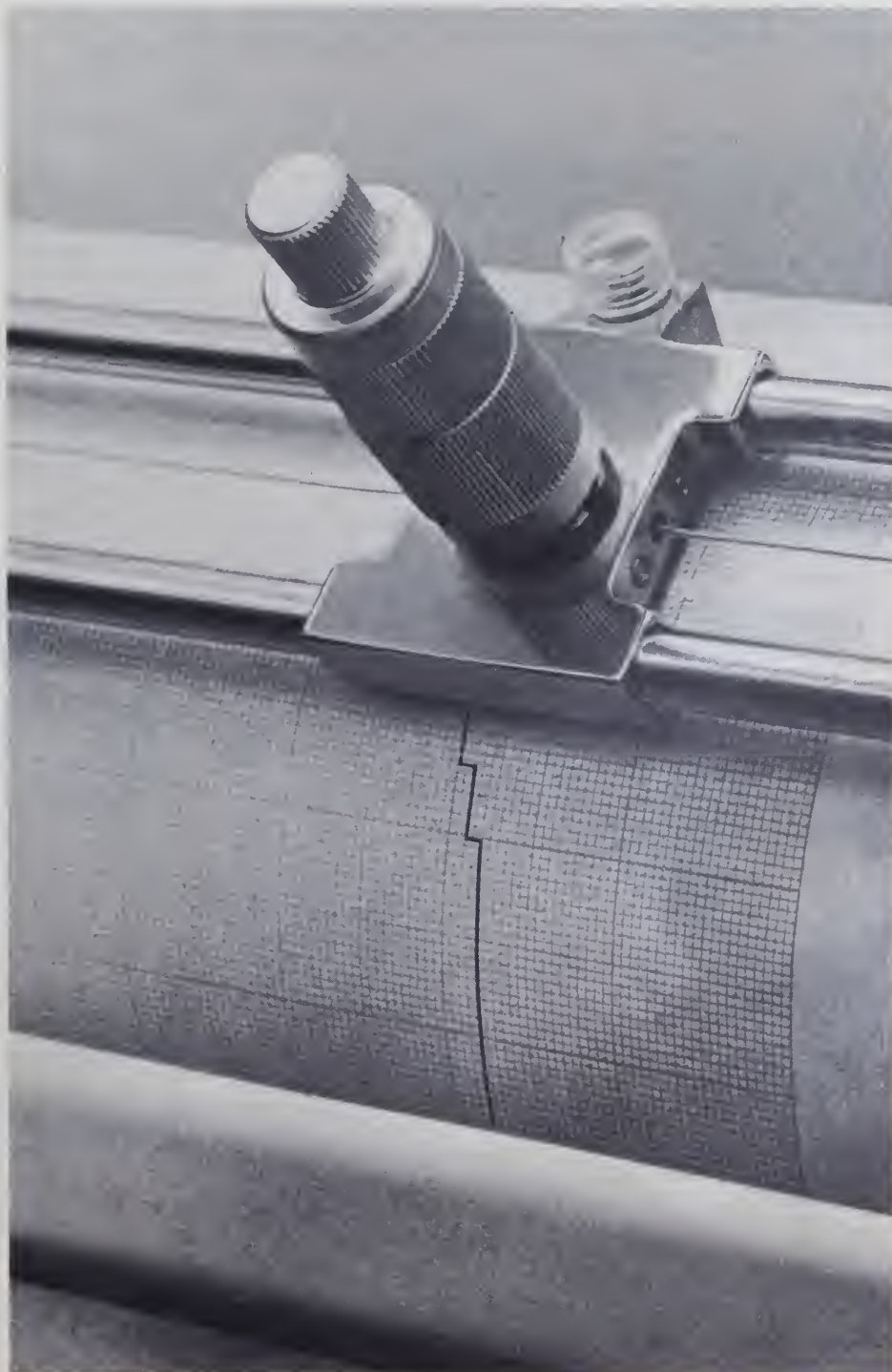
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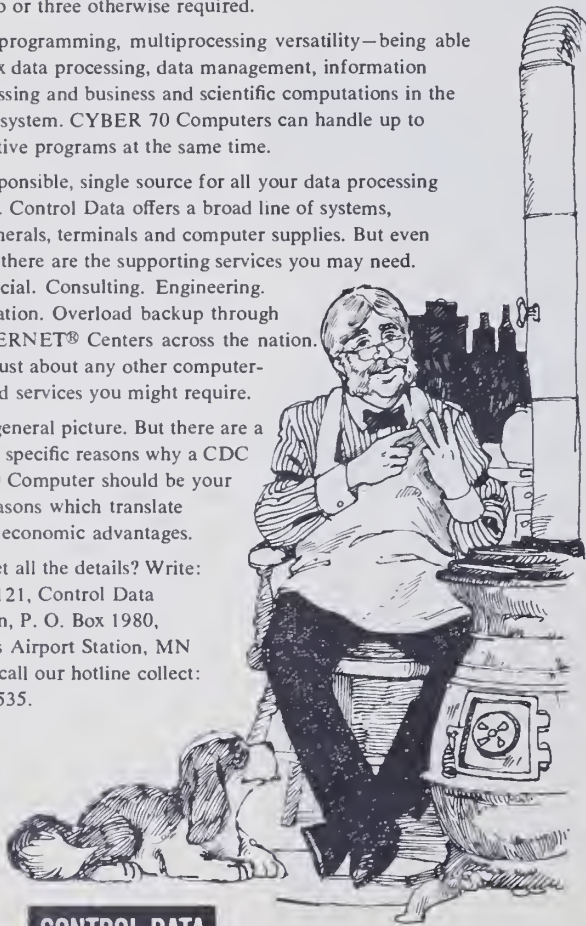
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Japanese Mini Computer Makers Active In Face of U.S. Inroads Into Market

By Bohdan O. Szuprowicz

Special to Computerworld

TOKYO—Since late 1968 Japan has been making a special effort to catch up with stateside minicomputer manufacturers and it now appears they have done well.

Ever since Hitachi introduced the Hitac 10 as a "personal computer" in 1969, not only the regular computer manufacturers but electric appliance, calculator, watchmakers, communications and software companies, and even textile manufacturers have plunged into the minigame.

In 1969 Hitachi, Fujitsu, Oki, Matsushita and NEC, all well known electronic manufacturers introduced minicomputers on the market. By 1970 eight new companies showed up with at least 10 new models and six more firms made a debut in 1971. Japanese industry sources estimate that at least 13 more companies will be unveiling additional minicomputers before 1972 is out.

No Idle Threat

These are no idle threats because some of the new entrants such as Hokushin, Shimadzu or Yokogawa already make process control machines and have the necessary technology and user bases.

Toshiba recently claimed to have the most advanced minicomputer in Japan. Known as the Tosbac 10E, it uses LSI and MSI in its design and costs 10% to 15% less than any existing Japanese mini.

The Tosbac 10E memory consists of MOS IC's of 1K bit/chip elements and is a first in domestic Japanese production. It has an 800 nsec cycle time and costs about \$6,450 for an 8K memory unit. Toshiba expects to make 50 per month.

Hitachi, on the other hand, claims to have the world's most inexpensive minicomputer in its new Hitac-Mini although no prices are available at this time.

Miti, the powerful Ministry of International Trade and Industry, recently announced the results of a survey of minicomputer usage in Japan.

As of March 1971 there were 1,670 units in operation and another 1,500 were estimated to have been installed by March 1972.

About 30% of all the minis are used to process business office information. About 50% of all minicomputers are delivered within systems and to OEM manufacturers. Of the remaining 50%, most are sold directly to users and the Miti survey expects this trend to continue.

Other Japanese estimates put the number of minicomputers in use at the end of 1972 at 4,300 to 5,000 and rising to 10,000 to 13,000 units by 1975.

While the Japanese deplore the multitude of minicomputer manufacturers fearing that many weak firms are engaged in unfamiliar production, they are all agreed on the need to prevent foreign penetration of the Japanese minicomputer market, particularly in the face of increasing liberalization of imports and investments during the next two

years.

Stunned by recent price reductions by IBM, Burroughs and Univac on their regular hardware, the Japanese looked upon minicomputers as an area where they could recoup lost ground and therefore were even more annoyed by price reductions announced recently by Digital Equipment Corp., the foreign minicomputer maker feared as much in mini circles as IBM is in regular computer markets.

Yet, the Japanese makers already command a crushing market share in minicomputers amounting to more than 70%. Hitachi is the leader with about 42% followed by Fujitsu with 17% and by Oki with 11%.

Next comes DEC, the largest importer, with 7% of the market

and the remaining 23% is shared by all the other Japanese and foreign manufacturers.

Recently DEC announced price reductions ranging from 2% to 6% and extended its warranty to Japanese customers from three months to a year. It sells through a Japanese agent, the Rikei Sangyo Co.

To counteract what the Japanese felt was foreign threat by minicomputer manufacturers, Miti put together some guidelines which in the spring of 1971 led to the formation of Nippon Mini Computer Co.

It is made up of seven firms: Takeda Riken Kogyo, Structural Design Research Laboratories, Toyota Koki, Aida Engineering, Sharp, Dai-ichi Kangyo Bank and Daiwa Bank.

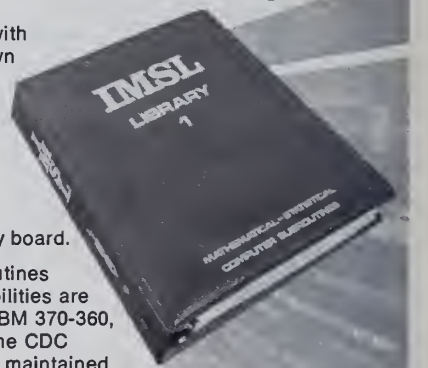
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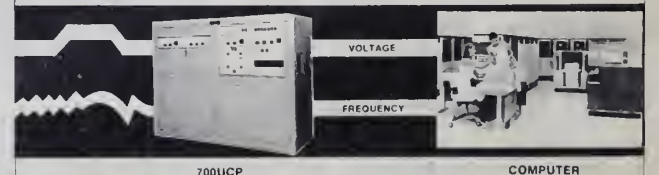


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Market Seen in Resource Planning Area

CANOCA PARK, Calif. — The field of resource planning is developing into a cohesive industry and may well become a major market for computers and computerized drafting devices, according to Richard Davison, marketing director at Xynetics.

Within five to ten years, resource planning, presently frag-

mented, will play such a key role in the nation's directions and priorities that a new "cabinet-level" department may have to be created to oversee the field, he predicted.

"But even if that doesn't happen," Davison said, "it is clear that the need for coordinated effort is reaching the critical

stage."

"In the past a zoning decision was strictly a city or county affair. But it is becoming increasingly evident that the choice between using a piece of land for a housing development, as a recreational area, or for forestry is a choice which can have statewide, or even national, implications.

Plan for Future

"Either industry or government is going to have to provide some over-all coordination to assure that we make maximum use of the available resources and plan properly for the future," he added.

The field, even in its present fragmented state, represents a major market for computer-based drafting equipment, he stated.

"And when it becomes an industry, instead of separate bits and pieces, it will very likely turn out to be the largest single user of graphics equipment for creating maps, graphics, charts and similar materials for planning, design and analysis.

"For example, everything from census breakdowns to highway routing studies to land use plans to pollution projections will require extensive application of automatic graphics technology," Davison predicted.

Univac Lands French Order

PHILADELPHIA — The French National Railway Co. (SNCF) has ordered three Univac 1110 systems valued at about \$13 million.

The computers will be used to direct message switching in a national network to expedite freight car control, to keep track of equipment maintenance, prepare train schedules and traffic flow surveys and compile statistics.

The computers will also perform such administrative functions as payroll processing, inventory control, computing pensions, social security payments and be used for engineering and scientific applications.

Other Orders, Installations

The Central Statistical Office of Hungary, Budapest, has ordered an OCR system from Scan-Data Corp.

The University of London, England, has ordered a Control Data 7600, valued at \$4.5 million, for scientific research, student training and teaching aids. The installation will serve as a regional DP center for nine universities.

Coronadata Co., a Gothenburg, Sweden service bureau, has ordered a Univac 9700 and 9400. The 9400 will be used for production planning, stock control, investment analysis, invoicing, payroll and general accounting. Vaxjo Data Services Co. ordered a 9200 II.

A Spanish service bureau, Centro de Calculo de Sabadell (CCS), has ordered a Control

Data Cyber 70 Model 73. CCS will process customer credit and savings transactions entered through on-line terminals for a bank, and offer remote batch services to other organizations.

Orders & Installations

NCR Century 100s have been ordered or installed by four British firms: The Shoreham Urban District Council, Le Carbone Ltd., Peters Management Service and Arrow-Hart (Europe) Ltd.

The National Postal Savings Bank of Argentina has ordered a B6700 for bank customer services and internal control operations.

Miles Druce and Co., a British steel distributor, has ordered two Univac 9400s to extend the firm's real-time order entry and inventory control systems.

Wates Computer Services Ltd., a London service bureau for the building industry, has purchased a Univac 1106. Programs will include design and estimating, forecasting, land optimization, subcontractors' payments and a model for use in land development projects.

The Chartered Bank of Hong Kong has purchased a \$1.3 million Univac 1106 to update an existing on-line system linking its branches. A Univac 1106 has been ordered by Chartered On-Line Ltd., a new DP service firm, in Hong Kong.

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80 Column
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Nickels & Dimes

Time to acquire funds division. Computer Transceiver Systems, Inc. (CTS), maker of Execuport terminals, signed an equipment leasing agreement with the North American Corp. under which up to \$16 million will be made available. The agreement provides for the formation of Computer Transceiver Leasing Systems Corp., which will purchase CTS equipment and lease it to customers. \$\$\$

Potter Instruments Inc. has obtained a new long term \$6 million loan due 1975-87 from the Equitable Life Assurance Society of the U.S., the principal purpose of which is to provide funds for the reduction of short term debt and for working capital. \$\$\$

Mohawk Data Sciences Corp.

plans to raise up to \$10 million through sales of its System 2400 peripheral processors to Randolph Computer Corp. Mohawk will continue to service the equipment on lease. \$\$\$

Remcom Terminals may wind up being owned by Transamerica Computer Co. Semiconductor Component Substrates Corp. (SCS) has agreed in principle to acquire Remcom Manufacturing Co., which will become a subsidiary, SCS Remcom Corp. SCS also has an agreement in principle with Transamerica Computer Co. by which Transamerica will purchase from SCS Remcom "a substantial portion of the SCS Remcom terminals for the purchase of leasing to the ultimate consumer."

Second Quarter Down

MAI Revises Forecast; Projects Loss

NEW YORK — A second quarter that did not live up to expectations and an examination of the factors responsible for the \$1.3 million loss has led Management Assistance Inc. (MAI) to drastically revise its earnings forecast for 1972. The firm now projects a loss for the year.

In the quarter ended March 31, the loss of \$1.3 million or 8 cents a share on revenues of \$12.8 million compares with restated earnings of \$925,028 or 5 cents a share in the same quarter last year, when revenues were \$13.3 million.

The 1971 figure includes a \$1.3 million extraordinary credit which helped boost the figures to the profit side of the ledger for that period.

Although the revenue for the quarter represents a decline over

the comparable period last year, MAI is quick to point out this represents the second consecutive quarter in which revenues have increased, after "10 previous quarters of steady decline, confirming our belief that the first quarter of fiscal 1972 constituted the revenue phase of our turnaround."

MAI, it seems, had anticipated an increase in revenues and a loss for the second quarter, but over-

estimated the revenues and underestimated the size of the loss.

The company now says it expects to incur a loss in the third quarter.

Revenues from sales of the Basic/Four computer system are lagging behind start up costs longer than anticipated, and application software programs are taking longer than expected to develop, the firm said.

T/S Firms Show Profits

Revenues are up at two time-sharing firms, Tymshare and Com-Share. And Com-Share Inc. modestly said that operations for the first nine months were "profitable and represent a continuation of quarterly improvement in performance."

Com-Share's earnings for the quarter ended March 31 rose sharply, to \$215,000 or 19 cents a share, up from a loss of \$196,000 or 23 cents a share in the same period last year. Revenues rose to \$1.8 from \$1.3 million.

In the nine month period, earnings totaled \$221,000 or 22 cents a share, compared with a loss of \$775,000 or 96 cents a share.

Tymshare's 24% increase in revenues for the first quarter amounted to \$3.5 million compared with \$2.8 million in the year before period. But earnings fell to \$110,438 or 4 cents a share from \$123,192 or 4 cents a share in the corresponding period last year, due principally to higher computer equipment costs. [CW, June 7].

The addition of three new computers will, however, "broaden the scope of services Tymshare offers to its present customers plus increasing the number of potential customers," the firm said.

Pansophic Sales, Earnings Increase

CHICAGO — Pansophic Systems, Inc., a privately-held software house here, surprised stockholders last week with a dividend of 25 cents per share.

The dividend was paid to stockholders at the annual meeting after president Joseph A. Piscopo announced that the firm had sales of \$865,442 and income of \$230,297, or 1.20 per share, in the year ended April 30.

In the previous year the firm had sales of \$431,639 and a loss of an undisclosed amount.

Data General Announces

Revenue, Earning Increases

SOUTHBORO, Mass. — Data General has reported sales of \$7.3 million for the quarter ended June 3. This compares with sales of almost \$4 million reported for the third period last year.

Earnings for the recent period were \$926,000 or 35 cents per share, contrasted with the \$415,000 or 18 cents per share reported for the comparable period last year.

Sales for the 36-week period ended June 3 totaled \$18.9 million with earnings after taxes of \$2.4 million or 91 cents per share. Sales for the first 36 weeks of the previous fiscal year were \$9 million with earnings of \$943,000 or 42 cents per share.

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Computerworld Stock Trading Summary

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CLOSING PRICES THURSDAY, JUNE 22, 1972

E	X	C	H	1972 RANGE (1)	CLOSE JUN 22 1972	WEEK NET CHNGE	WEEK PCT CHNGE
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SOFTWARE & EDP SERVICES

O	ADVANCEO COMP TECH	1- 2	1 3/8	0	0.0
A	APPLIED DATA RES.	4- 7	4 1/4	- 1/4	-5.5
O	APPLIED LOGIC	1- 4	2 3/4	0	0.0
N	AUTOMATIC DATA PROC	72- 91	90 3/4	+ 1/8	+0.1
O	BRANDON APPLIED SYST	1- 2	1 1/4	- 1/4	-16.6
O	COMPUTER DIMENSIONS	8- 14	9 3/4	- 3/4	-7.1
O	COMPUTER DYNAMICS	1- 4	1 1/4	0	0.0
O	COMPUTER NETWORK	4- 7	5	- 1/4	-4.7
N	COMPUTER SCIENCES	7- 10	6 3/4	- 1/4	-3.5
O	COMPUTER TECHNOLOGY	6- 8	5 1/2	0	0.0
O	COMPUTER USAGE	9- 14	10 1/4	- 1/2	-4.6
O	COMP AUTOMOT REPORTS	5- 9	5 1/2	- 1/4	-4.3
N	COMPUTING & SOFTWARE	18- 28	19	0	0.0
O	COMRESS	1- 3	1 3/4	0	0.0
O	COMSHARE	5- 10	7 3/8	- 1/2	-6.3
O	DATATAB	5- 9	5 1/4	- 1/4	-4.5
O	EDP RESOURCES	4- 8	3 1/2	- 1/2	-12.5
A	ELECT COMP PROG	3- 5	2 3/4	- 1/8	-4.3
N	ELECTRONIC DATA SYS.	43- 65	59 7/8	- 1/8	-1.8
O	INFORMATICS	8- 11	7 1/2	- 5/8	-7.6
O	I.O.A. DATA CORP	1- 2	3	+ 1/4	+9.0

A	ITEL	8- 12	8	-1	-11.1
O	KEANE ASSOCIATES	4- 7	4 1/4	0	0.0
O	KEYDATA CORP	7- 11	14	- 3/4	-5.0
O	LOGICON	4- 9	7 1/8	0	0.0
A	MANAGEMENT DATA	6- 10	7 5/8	- 5/8	-7.5
O	NATIONAL CSS INC	8- 25	23 3/4	0	0.0
P	ON LINE SYSTEMS INC	8- 20	19 3/4	+3 1/2	+21.5

N	PLANNING RESEARCH	11- 17	12 1/2	+ 1/4	+2.0
O	PROGRAMMING METHODS	22- 24	21 3/4	0	0.0
O	PROGRAMMING & SYS	1- 2	1	- 1/8	-11.1
O	SCIENTIFIC COMPUTERS	3- 4	2 5/8	- 1/4	-8.6
O	SIMPLICITY COMPUTER	1- 5	3 3/4	- 1/8	-3.2
O	TBS COMPUTER CENTERS	4- 6	5 5/8	- 1/4	-4.2
O	TRACOR COMPUTING	2- 3	1 7/8	0	0.0

O	TYMSHARE INC	7- 10	8 7/8	- 1/4	-2.7
O	UNITED DATA CENTER	5- 8	7 1/4	+ 1/4	+3.5
N	UNIVERSITY COMPUTING	19- 26	20 1/2	+ 1/2	+2.5
A	URS SYSTEMS	6- 10	8 5/8	0	0.0
O	VORTEX CORP	4- 5	2 1/2	0	0.0

PERIPHERALS & SUBSYSTEMS

N	ADDRESSGRAPH-MILT	34- 44	43	+1 7/8	+4.5
O	ADVANCED MEMORY SYS	12- 23	19	- 3/4	-3.7
N	AMPEX COPP	7- 15	7 1/8	- 1/4	-3.3
O	ANDERSON JACOBSON	5- 8	5 1/8	0	0.0
O	ATLANTIC TECHNOLOGY	1- 11	2 3/4	-6 1/4	-69.4
A	BOLT, BERANEK & NEW	5- 18	16 1/2	+ 7/8	+5.5
N	BUNKER-RAMO	9- 14	11 7/8	+ 1/8	+1.0

A	CALCOMP	17- 25	18 5/8	+1 5/8	+9.5
O	CENTRONICS DATA COMP	11- 53	47 1/2	-4	-7.7
O	COGNITRONICS	3- 5	3 3/8	+ 3/8	+12.5
O	COMPUTER COMMUN.	3- 7	2 5/8	- 1/2	-16.0
A	COMPUTER EQUIPMENT	3- 4	3 1/8	0	0.0
O	COMPUTER MACHINERY	7- 13	11 1/4	+1 3/8	+13.9
A	COMPUTEST	5- 9	5	0	0.0

A	DATA PRODUCTS CORP	5- 7	4 5/8	0	0.0
O	DATA RECOGNITION	3- 5	2 3/4	- 1/2	-15.3
O	DATA TECHNOLOGY	3- 5	2 7/8	- 1/8	-4.1
O	DI/AN CONTROLS	0- 8	5 1/4	- 7/8	-14.2
O	DIGITRONICS	2- 4	2 1/4	0	0.0
N	ELECTRONIC M & M	5- 8	5 5/8	- 1/4	-4.2
O	FABRI-TEK	2- 5	3 1/4	- 3/8	-10.3

O	GENERAL COMPUTER SYS	7- 16	13	0	0.0
N	GENERAL ELECTRIC	59- 70	68	+1 3/8	+2.0
N	HAZELTINE COPP	9- 13	10	-1 1/4	-11.1
O	INFORX INC	28- 47	41	- 1/2	-1.2
O	INFORMATION DISPLAYS	2- 5	2 3/8	- 1/8	-5.0
A	IUNY ELECTRONICS	10- 14	11 1/8	+ 1/4	+2.2
O	MANAGEMENT ASSIST	1- 2	3/4	0	0.0

N	MEMOREX	27- 38	27 3/4	- 7/8	-3.0
A	MILGO ELECTRONICS	17- 44	40 3/8	+1 7/8	+4.8
N	MOHAWK DATA SCI	20- 27	21 3/8	+ 1/4	+1.1
O	OPTICAL SCANNING	7- 16	10 1/2	-1 1/2	-12.5
O	PERTEC CORP	9- 17	9 3/4	- 1/4	-2.5
O	PHOTON	7- 15	12 3/8	- 1/4	-1.9
A	POTTER INSTRUMENT	13- 21	13 3/4	+ 1/4	+1.8

O	PRECISION INST.	7- 13	8 3/4	- 1/4	-2.7
O	RECOGNITION EQUIP	8- 15	7 3/4	- 3/4	-8.8
N	SANOERS ASSOCIATES	14- 21	15 3/8	+ 3/4	+5.1
O	SCAN DATA	7- 13	7 3/8	-1 3/8	-15.7
O	STORAGE TECHNOLOGY	17- 39	37 3/4	+ 1/4	+0.6
O	SYCOR INC	7- 11	10	+ 3/4	+8.1
O	TALLY CORP.	8- 15	13 1/4	- 5/8	-4.5

N	TEKTRONIX INC	34- 57	53 1/2	-1 1/2	-2.7
N	TELEX	9- 15	9 1/2	+ 1/4	+2.7
O	WILTEK INC	10- 26	20	+1	+5.2

SUPPLIES & ACCESSORIES

O	BALTIMORE BUS FORMS	6- 9	6 3/4	+ 1/4	+3.8
A	BARRY WRIGHT	9- 13	10 3/4	- 1/2	-4.4
A	DATA DOCUMENTS	17- 26	20 7/8	- 3/4	-3.4
O	DUPLEX PRODUCTS INC	9- 16	9 3/4	- 1/4	-2.5
N	ENNIS BUS. FORMS	7- 10	8 3/4	- 3/8	-4.1
O	GRAHAM MAGNETICS	15- 27	19 1/8	- 5/8	-3.1
O	GRAPHIC CONTROLS	12- 15	13	0	0.0

N	3M COMPANY	76-158	80 1/4	-73 3/4	-47.8
O	MOORE BUS. FORMS	42- 55	53 1/2	+ 1/8	+0.2
N	NASHUA CORP	48- 56	53 7/8	- 5/8	-1.1
O	REYNOLDS & REYNOLD	37- 77	38 1/2	- 3/4	-1.9
O	STANDARD REGISTER	16- 20	16 1/8	- 1/8	-0.7

E	X	C	H	1972 RANGE (1)	CLOSE JUN 22 1972	WEEK NET CHNGE	WEEK PCT CHNGE
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O	TAB PRODUCTS CO	14- 17	13 3/4	+ 1/4	+1.8
N	UARC	23- 28	24 7/8	+1	+4.1
A	WABASH MAGNETICS	8- 11	9 1/2	+ 1/8	+1.3
N	WALLACE BUS FORMS	22- 26	23 1/2	0	0.0

COMPUTER SYSTEMS

N	BURROUGHS CORP	147-190	190 3/8	+4 5/8	+2.4
N	COLLINS RADIO	14- 20	14 3/8	- 1/4	-1.7
N	CONTROL DATA CORP	43- 76	75 1/8	+2 5/8	+3.6
O	DATA GENERAL CORP	56- 99	91 1/2	-3	-3.1
O	DIGITAL COMP CONTROL	10- 25	12 1/4	0	0.0
N	DIGITAL EQUIPMENT	72- 97	84 3/4	-1 3/4	-2.0
N	ELECTRONIC ASSOC.	6- 13	10 5/8	- 5/8	-5.5

A	ELECTRONIC ENGINEER.	8- 14	8	- 5/8	-7.2
N	FOXBORO	34- 41	38	-1 1/8	-2.8
O	GENERAL AUTOMATION	13- 27	27	+4	+17.3
O	GRI COMPUTER CORP	3- 5	5	0	0.0
N	HEWLETT-PACKARD CO	46- 72	71 3/4	+ 1/8	+0.1
N	HONEYWELL INC	130-158	153 7/8	+ 1/4	+0.1
N	IBM	333-404	395 3/4	-1 3/4	-0.4

O	INTERDATA INC	8- 16	10 3/4	+ 1/2	+4.8
O	MICRODATA CORP	5- 10	9	- 1/4	-2.7
N	NCR	29- 35	33 1/4	0	0.0
N	RAYTHEON CO	37- 47	37 1/2	+ 3/8	+1.0
N	SPERRY RAND	30- 44	43 7/8	+4 7/8	+12.5
A	SYSTEMS ENG. LABS	11- 16	12 3/4	- 3/8	-2.8
N	VARIAN ASSOCIATES	14- 18	14	-1	-6.6

N	VICTOR COMPTOMETER	15- 24	20 3/8	+ 1/8	+0.6
N	WANG LABS.	35- 60	57 1/2	+1 1/4	+2.2
N	XEROX COPP	121-159	151 3/4	-1 1/4	-0.8

LEA	121-159	151 3/4	-1 1/4	-0.8
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A	BOOTHE COMPUTER	7- 18	7	- 7/8	-11.1
O	BRESNAHAN COMP.	2- 3	2 1/8	- 1/8	-5.5
O	COMOISCO INC	3- 12	12 1/4	+1 3/4	+16.6
O	COMPUTER EXCHANGE	2- 3	1 7/8	- 1/8	-6.2
A	COMPUTER INVSTPS GRP	8- 14	11 3/4	+1 7/8	+18.9
N	OPF INC	6- 13	6 1/4	- 3/8	-5.6
M	OATRONIC RENTAL	3- 4	2 3/4	0	0.0

A	OCL INC	5- 10	5 3/4	+ 3/8	+6.9
A	OEARBORN-STORM	18- 26	20 3/8	- 5/8	-2.9
A	DPA, INC.	5- 8	6	0	0.0
A	GRANITE MGT	7- 11	7 5/8	+ 1/2	+7.0
A	GREYHOUND COMPUTER	7- 11	7 1/4	- 1/8	-1.6
N	LEASCO CORP	18- 24	19 1/4	0	0.0
O	LEASPAC CORP	9- 15	9 1/4	+ 1/2	+5.1

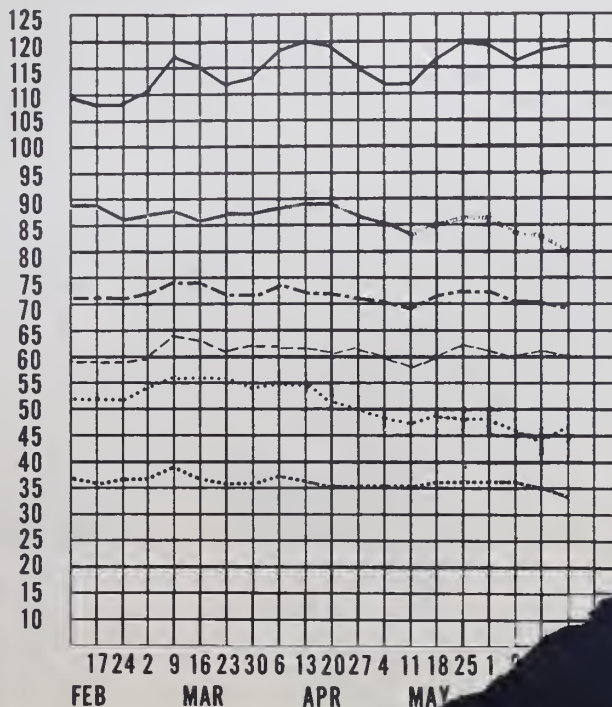
O	LECTRO MGT INC	2- 4	1 1/2	+ 1/8	+0.0
O	NCC INDUSTRIES	8- 11	7 5/8	- 1/2	-6.1
A	ROCKWOOD COMPUTER	4- 7	3 5/8	- 1/8	-3.3
O	SYSTEMS CAPITAL	3- 15	14 1/2	+ 3/4	+5.4
N	U.S. LEASING	19- 33	27	-3 3/4	-12.1

EXCH: N=NEW YORK EXCHANGE; A=AMERICAN EXCHANGE
L=NATIONAL EXCHANGE; O=OVER-THE-COUNTER
P=PHIL-BALT-WASH

O-T-C PRICES ARE BID PRICES AS OF 3 P.M. OP LAST BID
(1) TO NEAREST DOLLAR

Computer Stocks Trading Index

— Computer Systems ——— Software & EDP Services
..... Peripherals & Subsystems Leasing Companies
—— Supplies & Accessories ——— CW Composite Index



Earnings Reports

ADVANCED MEMORY SYSTEMS

Three Months Ended March 31

	1972	1971
Shr Ernd	\$19	\$19
Revenue	3,273,950	\$410,120
Spec Cred	a150,000
Earnings	287,616	(213,462)
6 Mo Rev	4,789,494	724,830
Loss	38,177	544,141

a-Tax loss carryforward.

DATATAB

Three Months Ended March 31

	1972	1971
Shr Ernd	\$06	\$05
Revenue	1,228,696	1,011,746
Earnings	52,212	43,049

a-Adjusted for 50% stock dividend in February 1972.

RAPIDATA

Three Months Ended March 31

	1972	1971
Shr Ernd	\$21	\$17
Revenue	1,703,766	1,209,765
Earnings	188,359	143,374

COMPUTER EQUIPMENT

Three Months Ended April 1

	1972	1971
Shr Ernd	\$08	\$06
Revenue	5,029,000	4,968,000
aSpec Cred	47,000	20,000
Earnings	189,000	145,000

a-In 1972 consists of gain on retirement of company's bonds and tax loss carryforward, less reserve for possible loss on investments. In 1971 consists of tax loss carryforward less loss from discontinued operations.

GENERAL KINETICS

Nine Months Ended Feb. 28

	1972	1971
Revenue	\$1,713,084	\$2,659,741
Loss	339,079	294,970

INFORMATICS

Year Ended March 25

	1972	a1971
Shr Ernd	\$28	\$18
Revenue	17,525,000	16,497,000
Loss Disc
Op	120,000	159,000
Earnings	424,000	268,000

a-Restated.

SYS COMPUTER

Three Months Ended March 31

	1972	1971
Revenue	\$249,501	\$70,489
Earnings	a15,374	(53,289)

a-Includes \$



EPOCH 4

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GRAHAM, TEXAS 76046